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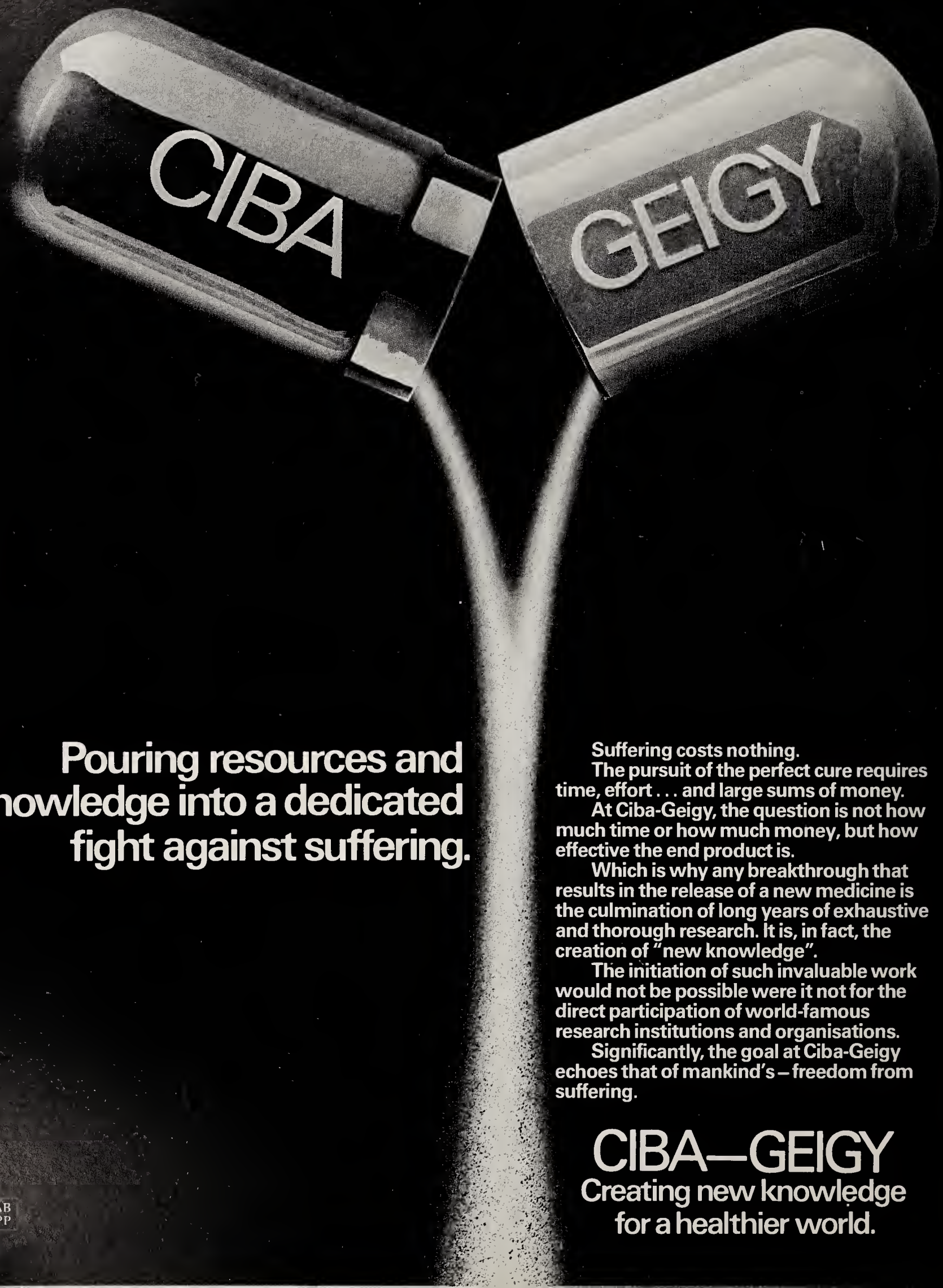
- Pancreatic Beta Cell Transplantation
- Tympanostomy Tubes
- Clinical Reasoning Process
- Treatment of Acute Knee

Bart Vallecoccia



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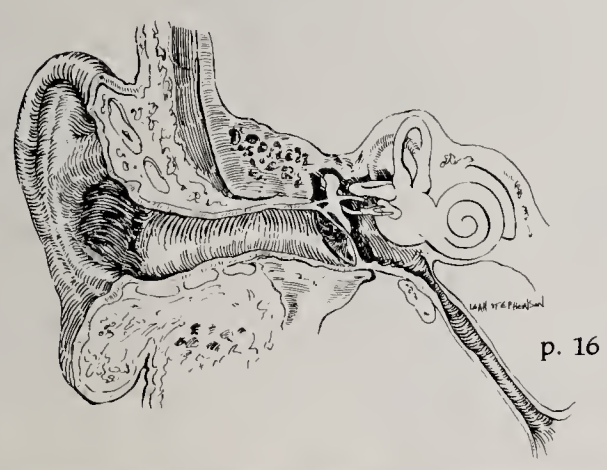
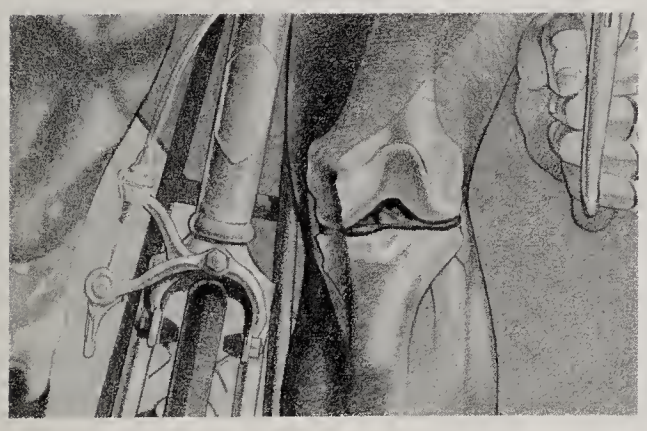
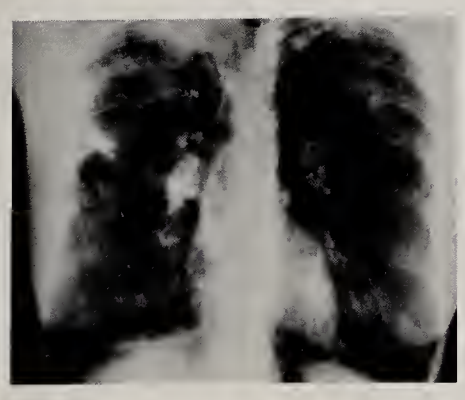
p. 10



p. 16



p. 22



p. 30

6 Immunology
TRANSPLANTATION OF PANCREATIC BETA CELLS
By Amy Rice, 9T0.

10 Otolaryngology
TYMPANOSTOMY TUBE INSERTION IN THE TREATMENT OF OTITIS MEDIA WITH EFFUSION: *A REVIEW*
By Christopher Compeau, 8T8.

16 Feature Article
THE CLINICAL REASONING PROCESS: *ESSENCE AND APPLICATION*
By Michael J. Weinberg, M.Sc., 9T0, Edward Davies, 9T0, Robert Cohen, Ph.D., Ian Soutter, M.D., F.R.C.S.(C), and Colin Bayliss, M.D., 6T1.

22 Orthopaedics
TREATMENT OF THE ACUTE KNEE WITH ANTERIOR CRUCIATE LIGAMENT DAMAGE
By Sherif P. Nessim, B.A.Sc., M.B.A. and James F. Kellam, B.Sc., M.D., F.R.C.S.(C).

30 Respirology Rounds
PULMONARY INFILTRATES AND EOSINOPHILIA
By Jody Lewtas, M.D., Robert H. Hyland, M.D., F.R.CP.(C), Michael A. Hutcheon, M.D., F.R.C.P.(C), and Robin R. Gray, M.D., F.R.C.P.(C).

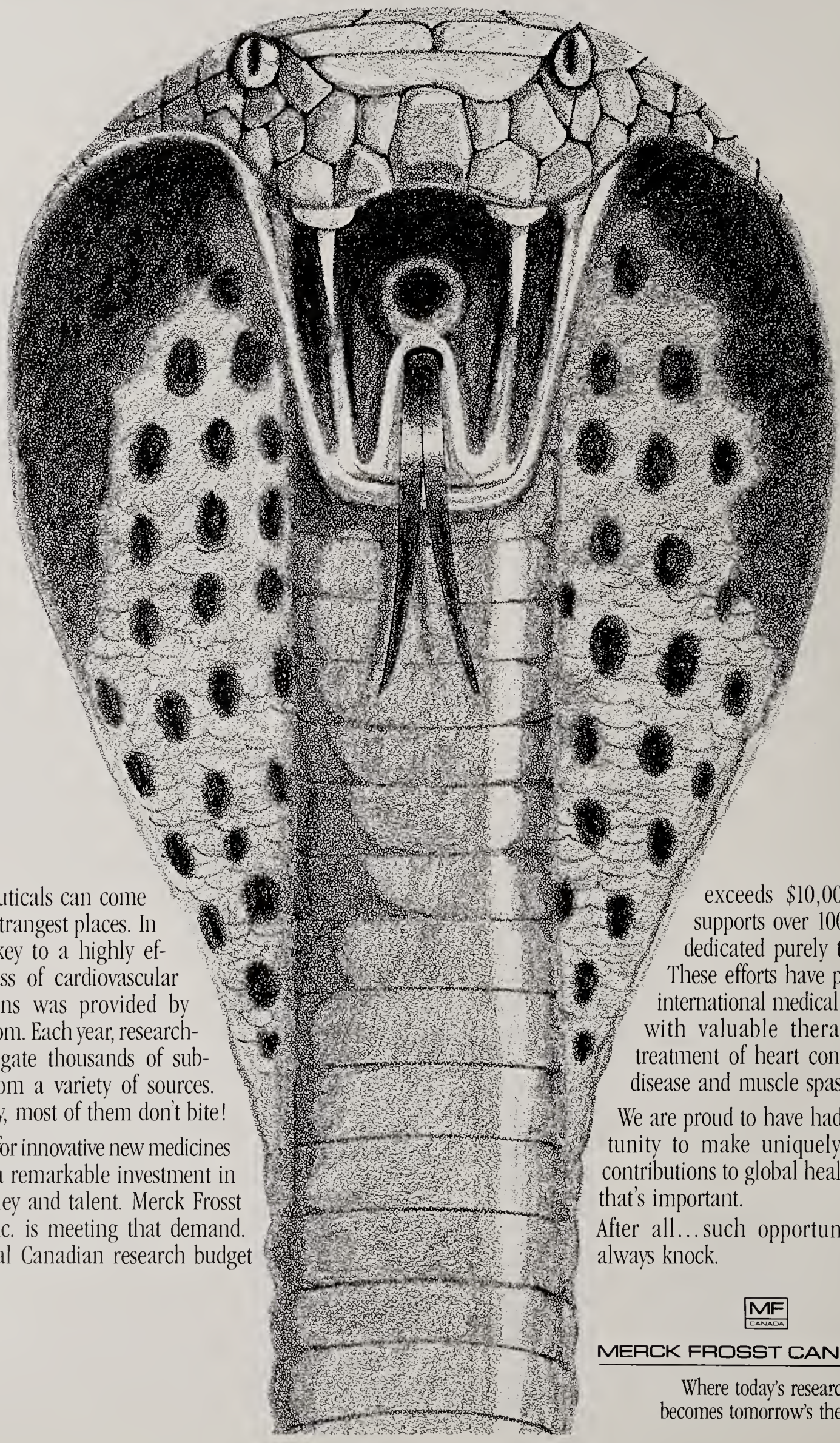
34 Computers in Medicine

36 News Updates

38 Book Reviews

Cover illustration: Bart Vallecoccia

OPPORTUNITY STRIKES



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Editorial

Michael Weinberg, Catherine Birt
Editors-in-Chief

This issue is the first of the 66th volume. Our predecessors have through their dedicated efforts established this Journal as the premier undergraduate medical journal in Canada. We intend to build on this.

The structure of the Journal is similar to last year, with four main sections. The editors have been chosen for their academic excellence and committment. The Journal is fortunate to have people of their caliber. We are also fortunate to have Shumin Lee as our artistic director. She is very talented and has a great deal of experience. The superb illustrations in this issue readily attest to this.

The Journal has a varied readership and it is a real challenge to produce an issue that will appeal to all its readers. We attempt to do so by publishing a wide range of topics. We are choosing articles that will be of general interest and feel that it is especially important to publish articles that discuss issues that are not covered well in our curriculum. The Journal still has a strong committment to research and basic science. As always, the Journal remains a platform for student ideas both scientifically, socially and educationally. It is a powerful medium and therefore a superb opportunity for medical students to gain experience and a reputation in the publishing world.

There are several prizes for articles published in the Journal. The best article, selected by the editors, will receive "The University of Toronto Medical Journal Prize for Literary Excellence" which consists of $100 cash. The two next best articles will receive $50 each. The department of Immunology sponsors an essay competition for second year medical students, and the winning article from last year, on Transplantation of Pancreatic Beta Cells, appears in this issue. The department of Orthopaedics also selects the winner of the R.I. Harris award from among the submissions in this field. Finally, there is also a prize for the best article in the neurosciences. These prestigious prizes should offer a great incentive to the students to write for the Journal.

The articles in this issue are all excellent. It was very difficult to choose them. In the article on Treatment of the Acute Knee with Anterior Cruciate Ligament Damage, the results of a retrospective study at Sunnybrook Medical Centre are discussed in relation to other studies. The Review of Tympanostomy Tubes in the Treatment of Otitis Media with Effusion is important because it is a common treatment for a common condition. Finally, the article on the Clinical Reasoning Process discusses an essential component of our education that is lacking in our curriculum. It should be most useful to all students and clinicians.

We look forward to an exciting year and wish all our readers the very best.

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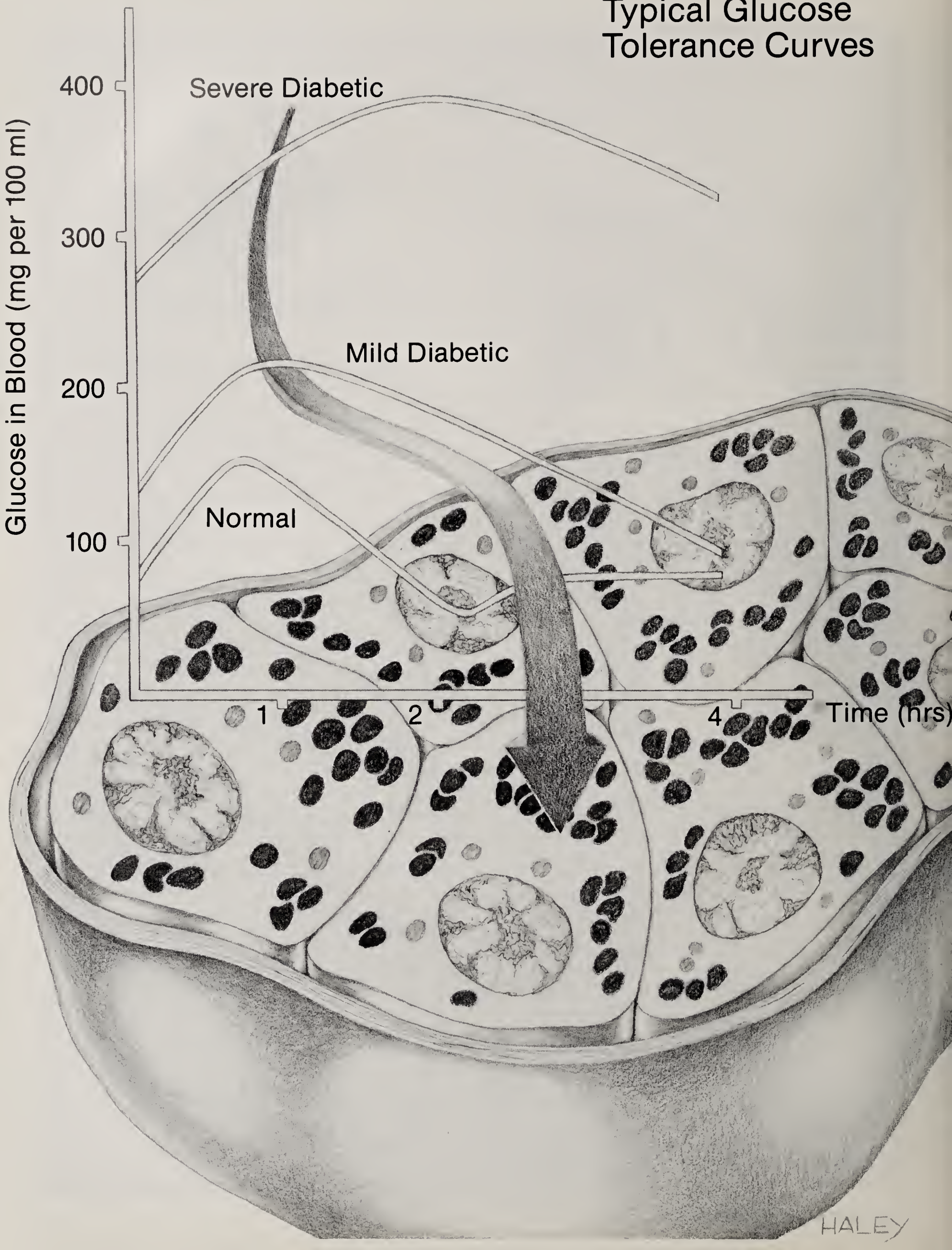

Transplantation of Pancreatic Beta Cells

A. Rice B.A., M.A., 9T0

Abstract

Beta cell transplants may restore pancreatic function in Insulin Dependent Diabetes Mellitus (IDDM). Islet cells have been successfully cultured and transplanted in several murine species. Both an allograft response and an ongoing autoimmune process affect the transplanted cells. While the precise nature of the autoimmune process has not been delineated, progress has been made in identifying reactive subsets of cells involved in the immune response. Initiating events in the pathogenesis of IDDM have been proposed, and a genetic component demonstrated. Manipulation of the immune response in mice and success with encapsulated allografts may point the way to human applications.

Transplantation of Pancreatic Beta Cells

Insulin dependent diabetes mellitus is a complex multifactorial disease characterized by progressive complications even with good control of blood glucose levels. Pancreatic beta cell transplants have been proposed as a logical solution, for functioning beta cells would ensure continuous normoglycemia and presumably result in much less morbidity and mortality in IDDM patients. While good results have been obtained with allograft transplants in mice and rats, trials on larger mammals and humans remain disappointing.[1-5] The many problems inherent in such transplants can best be grouped under two headings: those of rejection common to all allograft transplants, and those of an ongoing autoimmune process directed against beta cells. Considerable difficulty can be encountered in distinguishing between the two processes — the autoimmune disease and the allograft response.[6]

Islet Cell Preparations

Islet cells are extremely immunogenic, far more so than heart, liver or kidney tissue. This is in contrast to other endocrine cells, such as pituitary.[6,7] Yet there is no evidence of an islet/blood barrier or sequestration of beta cells as sperm are sequestered. One approach to allograft transplants is to reduce the immunogenicity of donor cells. This has been done by collagenase digestion, Ficoll separation, 95% O_2, 5% CO_2 and low temperature (24°C) culture conditions.[8] Success has been demonstrated with murine and human fetal cells under these conditions, and with UV or gamma radiation, cyclosporin and ALS to further reduce "passenger leukocytes."[9-10]

Animal Models

In studying beta-cell transplants an animal model is needed that closely approximates the human in pathogenesis of the disease. While much work has been done on streptozocin induced diabetes in mice, one ideally wants a spontaneously diabetic animal that develops insulitis and circulatory islet cell antibodies (ICA). This has been achieved with the NOD (non obese diabetic) mouse and BB rat.[11] But because IDDM is an ongoing autoimmune syndrome, these same animals exhibit a specific attack on transplanted beta cells. Prowse et al.[6] have successfully transplanted BB rats by inserting beta cells under the renal capsule. Because it is difficult to distinguish a rejection from an autoimmune response in this case, pituitary grafts were also inserted under the renal capsule. The beta cell graft, but not the pituitary graft, was destroyed, and exhibited antibody deposition. This suggests that the response is specific, is antibody mediated, and is seen both with MHC compatible and incompatible transplants.[6] Interestingly, only beta cells were destroyed, while alpha and delta cells were untouched. If the pattern in the BB rat is similar to that in humans (and it seems to be), then work is needed on how precisely the autoimmune response is mounted, and what subset of the immune system is the effector. MacKay et al[12] have found lymphoid cells of the BB/W rat cytotoxic to beta cells in vitro, and Wicker et al have been able to transfer IDDM using splenocytes from NOD mice.[12,13]

Immune Response in IDDM

There is intense research into the immune response, the genetic components and the environmental factors of IDDM. IDDM patients have been HLA typed, with a

positive association with HLA DR3/4.[14-18] Yet this in itself is simply a predisposing factor. Some workers have found that beta cells in human IDDM patients acquire and express MHC II on their surfaces, thus becoming antigen presenting cells.[19] Yet is this the consequence of some other event (trauma, viral infection) or the primary defect? We do not know how beta cells begin to express MHC II, although it may be in response to gamma interferon. ICAs, which are diagnostic, may appear before or after beta cells acquire MHC II. The immune response may be T-cell, antibody, NK or ADCC mediated. Is there a Ts defect or viral/bacterial antibody cross reactivity with beta cells that proceeds to the common final pathway of islet destruction? There is evidence for altered clearance of immune complex in rats and decreased Fc receptors on macrophages, but this was fond in streptozocin induced diabetes.[20] There is also evidence of NK cell abnormalities in the spontaneously diabetic BB/W rat.[21] Beta cells are sensitive to NK cells, and NK cells can be stimulated by interferon. This lends strength to the argument that the initial autoimmune response may be viral induced. Elevated ADCC has been demonstrated in the NOD mouse, and can be inhibited with nicotinomide.[22] Yet human studies of lymphocyte subsets and autoantibody targets are not definitive.[23-28]

Immunosuppression

What is obvious is that we do not know enough yet about immune, and specifically autoimmune, mechanisms to manipulate them to our advantage. Islet cell transplants require immunosuppression of the host, both to control rejection and to prevent disease recurrence. Our present immune suppression armamentarium is relatively limited and primitive (prednisone, cyclosporin, ALS). Cyclosporin, while able to suppress insulitis in human subjects, is also nephro-, hepato- and beta-toxic.[29,30] For the amount of time that an islet cell transplant has to be viable to improve on current survival of IDDM patients (IDDM is an early onset disease), immunosuppression is as pathogenic as the original disease. Two approaches that should be further investigated are encapsulation and bone marrow grafting.

Encapsulated beta cells have survived in non-immunosuppressed mice.[31,32] Given that segmental human and syngenic transplants have been destroyed by recurrent disease, this model bears investigation.[33,34] Insulin can diffuse out, and nutrients in, without any exposure to immune cells. This artificial blood/beta barrier could circumvent the immune response as can bone marrow transplants combined with beta cell grafts in the BALB mouse.[35] Yet this would be costly in terms of morbidity and mortality in humans, given our present state of expertise in bone marrow grafts.

Future Research

Ultimately the solution lies in better understanding of the immune system itself. Future research should elucidate specific targets of ICAs, subsets of cells involved in the immune response (Ts, Tcs) and activating factors such as IL-2 and interferon. Recent work in genetics has revealed an allele governing amino acid residues in the HLA-DQ beta chain that may give great insight into pathogenesis and diagnosis of IDDM.[36] In the future, IDDM may be managed with better immunosuppression (new generation cyclosporins), transplants, or vaccination against common precipitating factors such as EBV, CMV and coxsacki viruses. Or, better yet, we may learn to manipulate the immune system by either increasing or turning on Ts cells. The manipulation of Ts and Th cells, without disastrous unbalancing of the entire immune system, would be the ultimate "cure" for a large number of autoimmune diseases.

Summary

For the present, encapsulation and transplantation look like attractive "cures," at least in murine models. Islet cells can be cultured and transplanted under the right conditions. Once transplanted, beta cells must be protected from both the host's allograft response and ongoing autoimmune disease process. While these problems can be overcome in mice, both bone marrow transplants and longterm immunosuppression are considerably more problematic in humans. A better understanding of the autoimmune process in IDDM and its initiators may lead to simpler and more elegant solutions in the future —"cures" based on subtler manipulations of cell subsets than can be achieved with current immunosuppression.

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Tympanostomy Tube Insertion in the Treatment of Otitis Media with Effusion: A Review

Christopher Compeau, 8T8

Abstract

Otitis media with effusion is a common medical problem. Acute purulent otitis media and secretory otitis media are two forms of this disorder. Conductive hearing loss is a notable complication of middle ear effusion. Antibiotic therapy is the treatment of choice for otitis media with effusion; nevertheless, disease may persist or recur despite standard medical intervention. In these cases the surgical insertion of a tympanostomy tube is often warranted to restore normal hearing and prevent further complications. Tympanostomy tube insertion is well established as an effective and relatively safe treatment for recurrent and persistent otitis media with effusion.

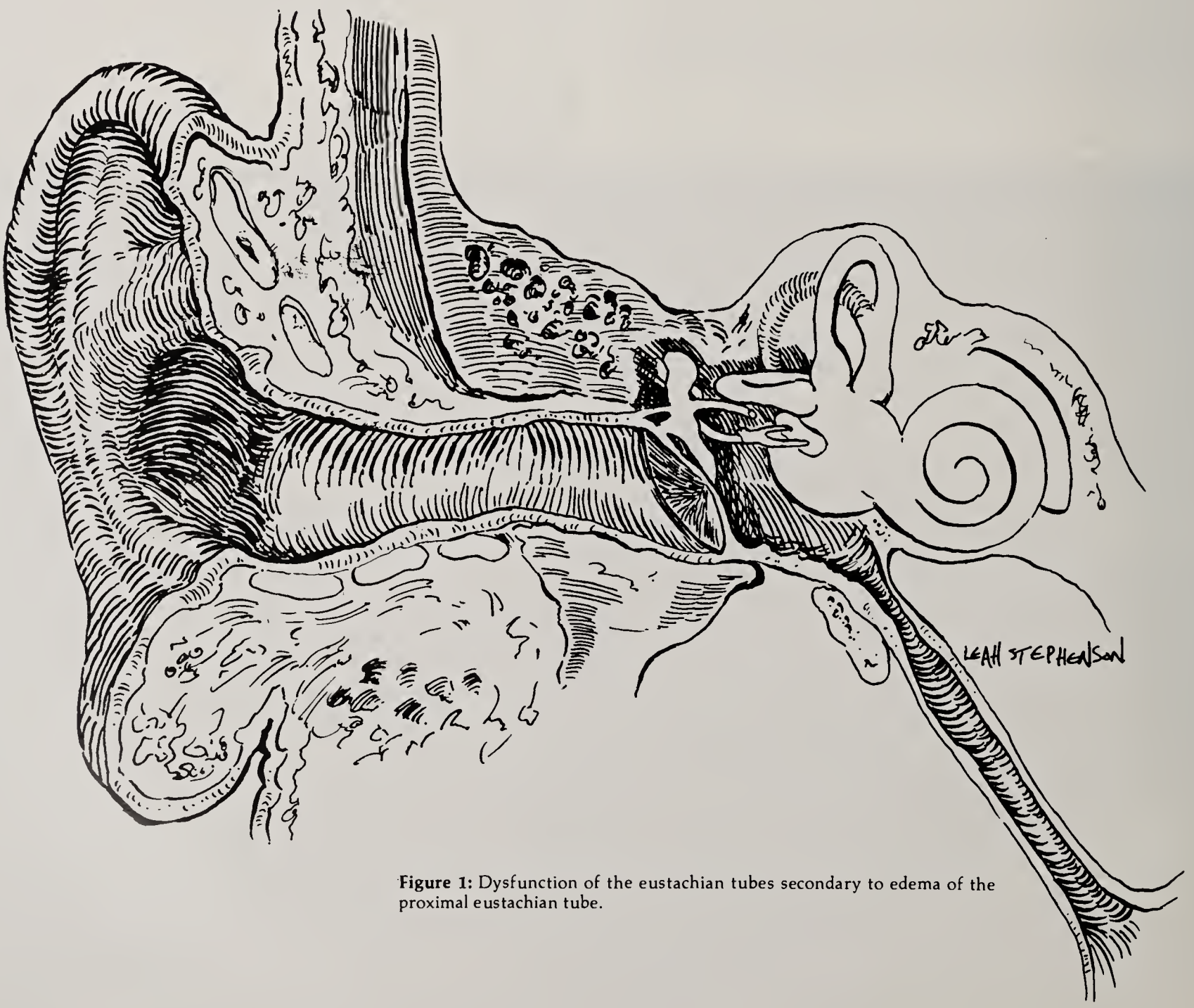

Figure 1: Dysfunction of the eustachian tubes secondary to edema of the proximal eustachian tube.

Introduction

Otitis media, in its various forms, is presently the single most common problem seen by both pediatricians and otolaryngologists.[11] Antibiotic therapy is generally regarded as the treatment of choice when this condition arises. However, middle ear effusion, with or without recurrent symptomatic episodes of acute middle ear infection, may persist despite appropriate medical treatment. The potential sequelae of chronic middle ear effusion, including conductive hearing loss, are well documented.[5] In order to prevent the development of these complications, insertion of a ventilation tube into the tympanic membrane is often indicated. In fact, tympanostomy tube insertion for the treatment of otitis media with effusion is presently the most commonly performed operative procedure in children that requires general anesthesia.[2]

This paper will review the current understanding of the pathophysiology and natural history of otitis media with effusion and outline the role of tympanostomy tube insertion in the treatment of this common condition.

Otitis Media with Effusion

Otitis media with effusion is a broad descriptive term which includes acute purulent otitis media and secretory or serious otitis media. Although these conditions differ with respect to histopathology and clinical presentation, each essentially involves the accumulation of middle ear fluid secondary to eustachian tube dysfunction.

Acute purulent otitis media is a condition in which signs and symptoms of acute inflammation of the tympanic membrane are present (fever, otalgia, bulging, erythematous typmanic membrane) with evidence of suppurative fluid in the middle ear. This is predominantly a disease of infants and young children, with at least one episode affecting approximately 50 percent of all children by three years of age.[2] Strangerup and Tos, utilizing otoscopy and tympanometry to detect acute suppurative otitis media in children, reported an incidence highest in the first year of life, at about 22 percent, and a uniform prevalence of approximately 25 percent during the first five years of life.[11] Several investigators have reported comparable epidemiological data.[11] Acute purulent otitis media clearly represents a medical problem of enormous proportions.

Eustachian tube dysfunction is presently considered to be the major factor in the development of acute purulent otitis media.[2,3] Other factors that appear to play a role in the multifactorial pathogenesis of this condition include the presence of viral and bacterial infection in the nasopharynx, allergy, and immunologic reactivity.[11] A popular model submits that nasopharyngeal viral infection induces an antibody-mediated response in the host which results in the release of histamine. This vasoactive substance causes edema of the proximal eustachian tube (Figure 1). The viral infection and eustachian tube edema impair both neutrophil and ciliary function, allowing bacterial invasion of the tympanum.[2]

The end result of this process is bacterial otitis media. Developmental features of the eustachian tube in infancy help to explain further the relative preponderance of otitis in this age group. The short, horizontal position and poorly developed muscular function of the eustachian tube appears to make the infant more susceptible to bacterial influx from the nasopharynx.[5]

The commonest bacterial causes of acute otitis media, in order of decreasing frequency, include *Streptococcus pneumonia, Hemophilius influenza, Branhamella catarrhalis, Streptococcus pyogenes,* and *Staphylococcus aureus.*[2] Antimicrobial therapy is presently considered the treatment of choice. Ampicillin and amoxicillin are commonly-prescribed antibiotics that are usually effective against the most commonly-encountered bacteria. Other drugs that appear equally efficacious include cefaclor, erythromycin-sulfisoxazole, and trimethoprim-sulfamethoxazole.[11] However, with the emergence of resistant strains of *H. influenza* the use of amoxicillin-clavulinic acid is gaining favour as the first-line antibiotic for acute otitis media. Following medical treatment, it is essential that the condition of the middle ear be assessed by pneumo-otoscopy and, if available, tympanometry.[3] The success of antibiotic treatment should never be judged solely by the resolution of fever and otalgia. A thorough clinical evaluation is required to identify those patients in whom asymptomatic middle ear effusion persists.

The persistence of middle ear effusion without clinical evidence of infection describes a condition known as secretory otitis media. This disease is generally considered a sequal of acute otitis media.[8,11] Teele reported persistent effusion at three months in 10 percent of children who were examined following initial episodes of acute otitis media.[2] Nevertheless, secretory otitis media is not always preceded by acute otitis media. In 22 percent of cases of chronic effusion Sade reported there was no previous history of acute middle ear infection.[5] Although the exact cause of secretory otitis media is not known, the etiological factors are similar to those for acute purulent otitis media. The effusion appears to be produced by middle ear mucosa in response to bacterial, immunologic, or antigenic stimulation.[8] This fluid accumulates due to impaired functioning of middle ear clearance mechanisms.[15] Again, eustachian tube dysfunction plays a primary role.

The initiation or continuation of antibiotic treatment is generally advocated when secretory otitis media is detected.[4] Although most middle ear effusions are sterile, positive bacterial cultures of serous middle ear effusions have been documented and thus, support this line of therapy.[5] Interestingly, several studies have suggested that antibiotics may in fact encourage chronic effusion by altering middle ear immune mechanisms.[15] Indeed, the incidence of secretory otitis media has increased during the antibiotic era.[5] Other medical therapies, such as nonsteroidal anti-inflammatory agents, antihistamines, and decongestants, have proven ineffective in the treatment of secretory otitis media.[15] Fortunately, there is a tendency for the effusion to resolve spontaneously.[11,15] Nevertheless, a knowledge

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of this tendency to resolve must be weighed by an appreciation of the potential complications of chronic secretory otitis media.

Complications of Otitis Media with Effusion

The complications of otitis media with effusion include hearing loss, tympanosclerosis, cholesteotoma, and performation.[12] Prior to the advent of antibiotics, otitis media was the most common cause of meningitis and cerebritis. These serious intracranial complications are, fortunately, now quite rare. Hearing loss is by far the most common and morbid complication of otitis media with effusion.[3] In varying degrees episodic or persistent conductive hearing loss is always associated with both acute purulent otitis media and secretory otitis media.[5] If left untreated, the hearing loss produced by otitis media with effusion may have profound effects on the development of a child. By impairing cognitive, linguistic, and psychosocial development, otitis media with effusion may cause significant educational delay. To prevent this, and other less common complications, the insertion of a ventilation tube into the tympanic membrane is often indicated.[5]

The Effects of Tympanostomy

The value of surgically creating a hole in the tympanic membrane to treat otitis media with effusion has been recognized for several hundred years.[6] However, the efforts of earlier otologists were frustrated by an inability to keep these tympanostomy incisions from spontaneously closing. With Armstrong's introduction of a vinyl plastic tympanostomy tube in 1954 an effective technique for maintaining the patency of tympanostomy incisions was found.[8] The tube acts to equalize the negative middle ear pressure caused by the dysfunctional eustachian tube and thereby prevent both mucosal effusion and bacterial influx from the nasopharynx. The tube also appears to help drain the middle ear effusion, both via the tube itself and eventually through the eustachian tube once ciliary clearance function is restored.[15]

The effects of tympanostomy tube insertion are often impressive. Serous middle ear effusions quickly resolve and normal hearing is rapidly restored.[15] Furthermore, there is a significant decrease in the recurrence rate of acute purulent otitis media when the tube is in place.[3] Insertion of ventilation tubes for treatment of acute non-suppurative otitis media is controversial and not well established. Presently, the most common indication for tympanostomy tube insertion is secretory otitis media.[12]

Ventilation Tubes Available

Tympanostomy tubes are available in a variety of shapes and sizes, each with a specific indication and function. They are generally classified according to their short-term or long-term ventilating capacity. The Shepard tube is a commonly used short-term ventilating tube (Figure 2). In children, it is inserted under general anesthesia into the anterior-superior quadrant of the tympanic membrane with the aid of an operating microscope (Figure 3). In adults and cooperative older

children, the tubes can be inserted with or without local anesthesia in an office or clinic setting. The tubes fall out of the tympanic membrane in six to twelve months and are subsequently extruded from the external ear canal.[5,6] Patients are advised not to allow water to enter the ears while ventilation tubes are in place since there is a small risk of fluid entering the middle ear and causing infection.[6]

The use of a long-term ventilation tube should be considered whenever otitis media with effusion recurs following the extrusion of a short-term tube. These tubes have a larger inner flange and therefore are anchored more solidly to the tympanic membrane. The Goode T-tube and Per-Lee tube are examples of well-known long-term tympanostomy tubes (Figure 2) which can, theoretically, remain in place indefinitely.[7,9]

Complications of ventilating tubes include otorrhea, tympanosclerosis, persistent perforation, and cholesteatoma.[4] Otorrhea is the most frequent complication, occuring in approximately 20 percent of patients.[5] Otorrhea is thought to occur secondary either to water contamination through the tube or to nasopharyngeal reflux in the middle ear. In some cases antibiotic treatment is necessary to decrease post-intubation otorrhea. Tympanosclerosis, or scarring of the tympanic membrane, may also occur following insertion of a ventilation tube. The significance of this complication is questionable, since tympanosclerosis rarely affects hearing and is also often seen in untreated otitis media with effusion.[5] Persistent perforation is an uncommon complication which is generally seen more frequently with long-term, use of a tympanostomy tube.[5] Cholesteatoma, a squamous cell and cholesterol middle ear tumour, is also an uncommon complication.[4] Ossicular

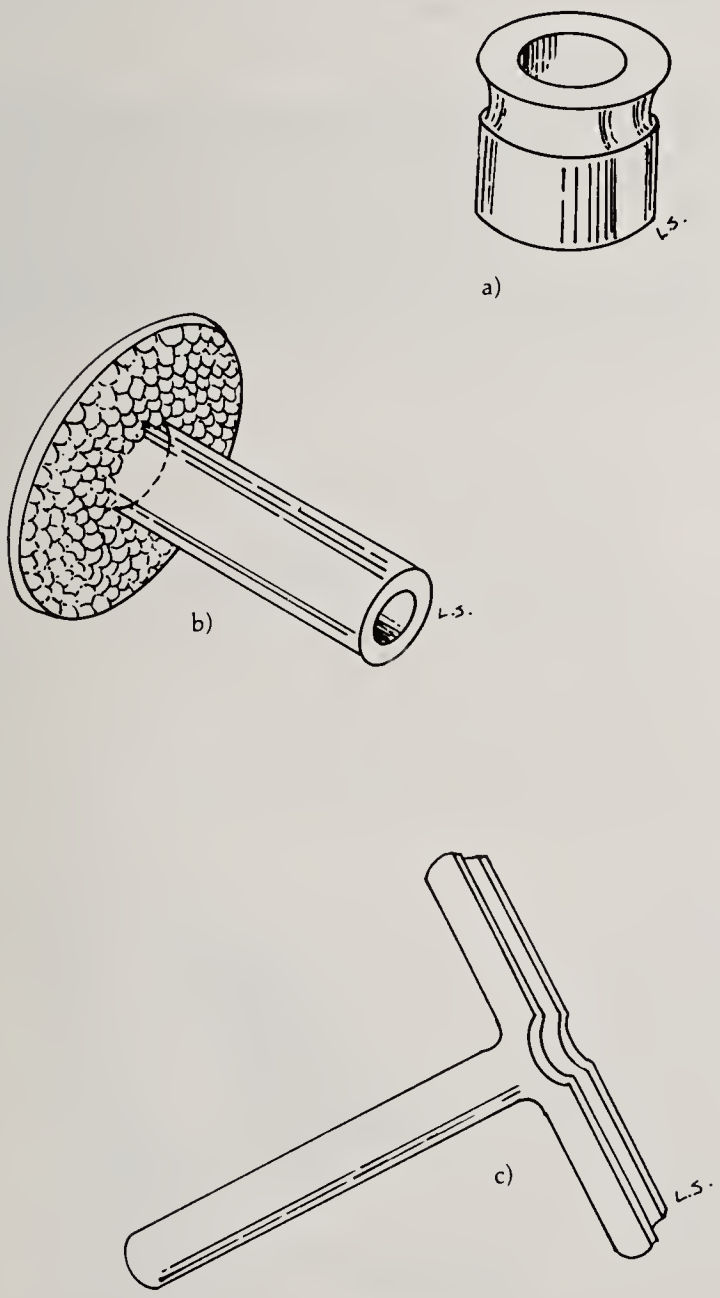

Figure 2: Tympanostomy tubes.
a) Shepard tube
b) Per-Lee tube
c) Goode T-tube

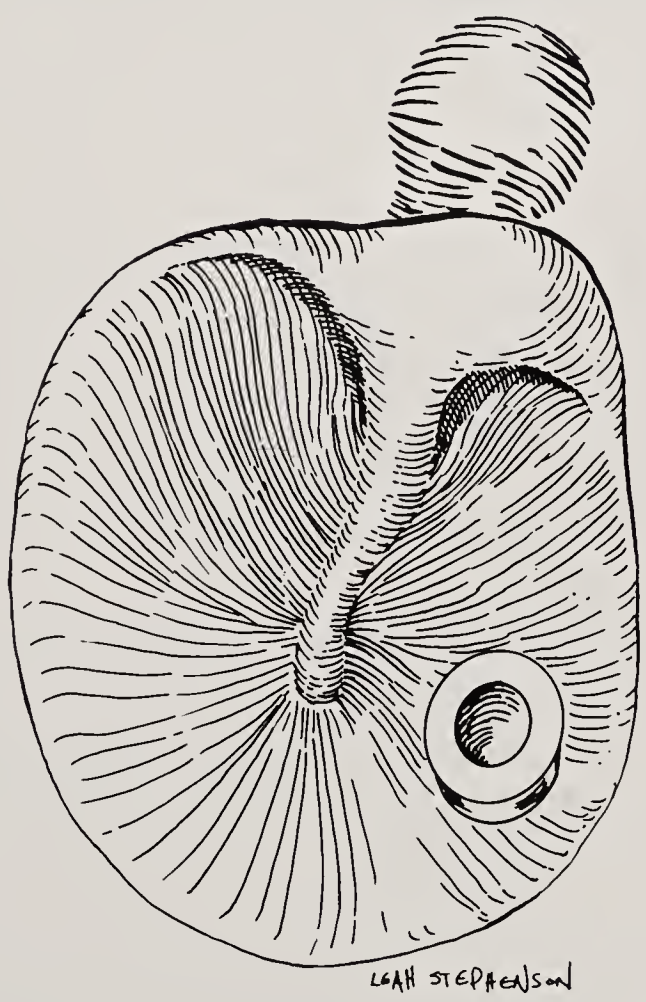

Figure 3: Right tympanic membrane with Shepard tympanostomy tube *in situ*.

disruption and facial nerve palsy are serious but rare consequences of tube placement. In general the risks and complications of tympanostomy tube insertion are minimal.

Controversies

Most authorities agree that insertion of tympanostomy tubes is an effective form of treatment for otitis media with effusion. Nevertheless there is some controversy regarding the optimal timing of tube insertion.[5] When do the adverse effects of persistent or recurrent effusion outweigh the risk of waiting for the middle ear fluid to resolve spontaneously? This question is difficult to answer without supporting data from randomized clinical trials.[4]The current recommendations for tympanostomy tube insertion include persistent secretory otitis media of three months duration, unresponsive to medical management or four episodes of recurrent acute purulent otitis media within one year.[4] Despite these guidelines, the decision to insert a ventilating tube is often an empirical one, frequently influenced by the concerns of parents and the individual preferences of otolaryngologists. A variety of circumstances could justify departure from these guidelines either in a more conservative or a more aggressive direction.[13]

The widespread use of tympanostomy tubes has received criticism from those who are not convinced that the immediate beneficial effects of tube insertion outweigh the potential complications and sequelae. The unknown implications and potential risks of eardrum scarring is a subject of particular concern.[13] As previously noted, tympanostomy tube insertion is not an innocuous procedure. There are several complications associated with tube insertion; however, these are presently considered to be either minor or uncommon events. Furthermore, the popularity of the tubes is based on their success in restoring normal hearing and preventing the recurrence of otitis media with effusion when standard medical therapy has failed. A routinely effective nonsurgical method of treating otitis media with effusion would be preferred. Unfortunately, no such remedy is presently available. In the absence of a more effective form of treatment for this condition the continued use of ventilation tubes seems reasonable.[4]

Conclusions

Otitis media with effusion is a medical condition that is notably common in infants and children. Acute purulent otitis media and secretory otitis media are two types of otitis media with effusion. These disorders include an accumulation of middle ear fluid which, if untreated, contributes to conductive hearing loss. When antibiotics fail to prevent otitis media from persisting or recurring, the use of tympanostomy tubes must be considered. Insertion of these tubes allows for drainage of middle ear fluid, restoration of normal hearing, and prevention of recurrent disease. Thus, tympanostomy tubes are an essential component of any effective management plan for otitis media with effusion.

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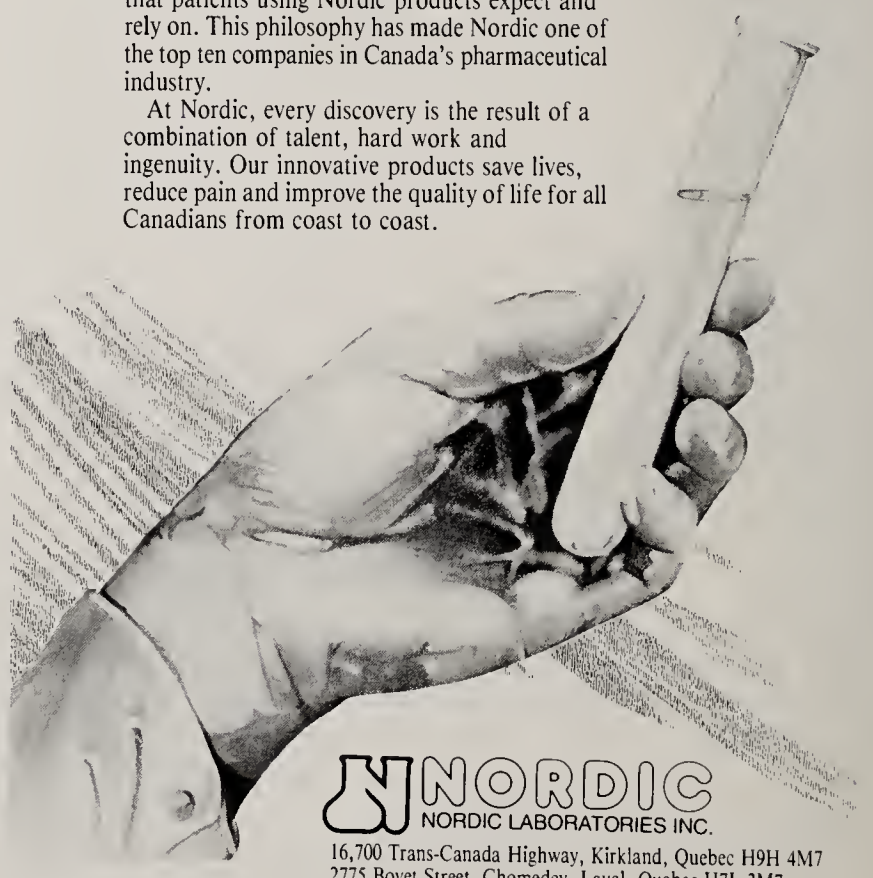

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The Clinical Reasoning Process: Essence and Application

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Abstract

The clinical reasoning process (CRP) is the scientific method of clinical medicine. It is, however, not formally taught in our traditional curriculum. The first part of this paper presents an analysis of the CRP and examines reasons why it is not taught. The second part of the paper applies the CRP model to an actual case of multi-system trauma.

Introduction

It has happened to all of us. Nothing infuriates a staff person more than when the student reels off a comprehensive history and thorough physical exam, laden with facts but no working hypothesis. However most students would also agree that nothing infuriates them more than being drowned with information but deprived of concepts to help "tie it all together". Knowledge which cannot be used is useless.[1] There is a way out.

The clinical reasoning process (CRP) is one of the most essential sets of abilities a physician must possess. It is the cognitive process that is necessary to evaluate and manage a patient's medical problems. Basically, it is the scientific method of clinical medicine. Most often this is referred to as problem-solving. This term is not used here since it implies that the primary task of the physician is to solve problems. Since many of the problems in medicine are insoluble, the usual task of the physician is to evaluate or analyse the patient's problems as far as possible or necessary, so that they can be managed effectively.[2]

There are many reasons why the CRP is not taught. These are deeply rooted in our traditional curriculum, and will be examined in detail later. The CRP should be taught because it is central to clinical medicine. It is the method of approach to patient problems which, unlike the myriad of facts, is not forgotten and actually aids in fact recall.[3] There are methods to teach the CRP.[4,5,6,7,8,9] There is evidence to suggest that when it is taught it significantly increases student's performance[10,11] and, when used, the physicians' skills in evaluation and patient management are greatly increased.[2]

Model of the Clinical Reasoning Process

The following descriptions attempt to characterize the segments of the CRP process. Each describes a distinctly different behaviour and attempts to put them in a sequence that follows the order of their appearance in the patient encounter.

The moment a physician encounters a patient, information begins to be compiled. This initial information is in the form of cues, both verbal and non-verbal which the physician perceives instantly. This is the first step in

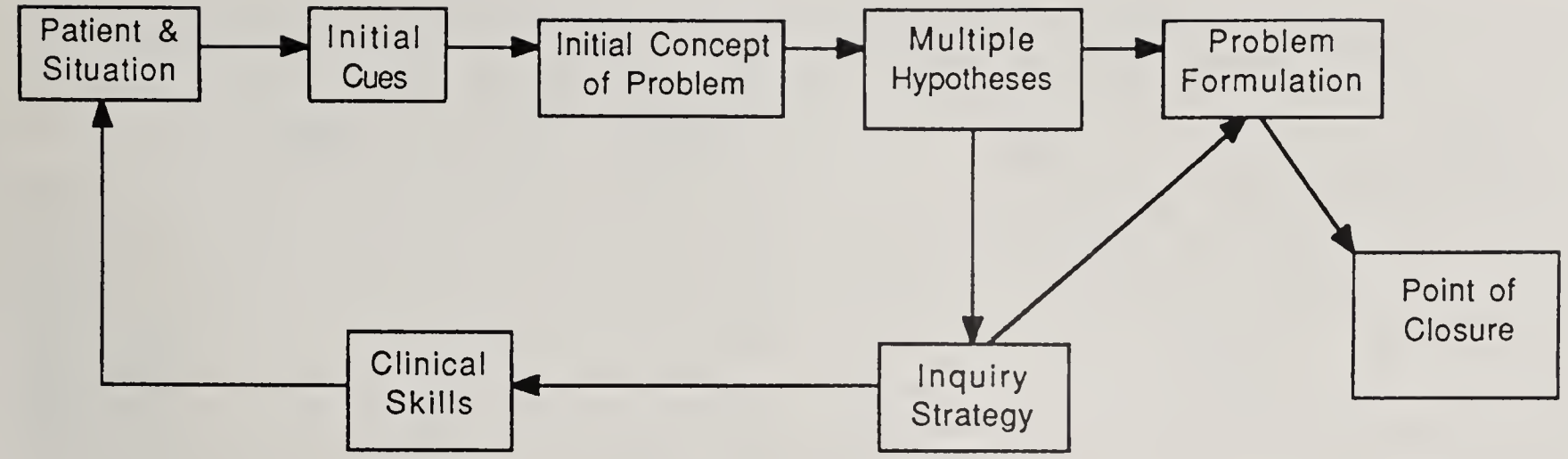

Fig 1: Steps in the Clinical Reasoning Process (modified from Ref. (2))

the CRP (Fig 1), and is performed almost unconsciously by the physician. The particular cues that are selected from all of the information initially available are largely determined by the physician's past experience and the present setting for example, the emergency room.

The initial cues which are thought to be relevant comprise the initial data. The assembling of this information into an initial concept of the problem is the second step in the CRP. This occurs instantaneously and so determines the direction and scope of the CRP. This model is discussed extensively by Barrows.[2]

Within moments of the encounter, almost simultaneously with the initial concept, a number of hypotheses are generated from the initial cues. This is the third step in the CRP. These hypotheses are critical, because they serve as guides for further inquiry. The number of hypotheses and their specificity is dependent on the nature of the presenting information and the physician's experience.[12] These hypotheses are usually a product of the clinician's past experience and their appearance from the clinician's memory banks is largely an unconscious act of memory association. It is the automatic or unconscious nature of this process that has made it difficult to demonstrate how physicians actually think. The efficiency, effectiveness and quality of the clinician's evaluation are largely dependent on the hypotheses generated. There may be a tendency to start with broad, generalized hypotheses and as the information unfolds, to focus or increase their specificity. The importance of multiple hypotheses is that they prevent premature decisions, since they force the physician to consider possible alternative explanations.

The hypotheses generated are processed in parallel since this is a much more efficient method for clinical reasoning. A variety of data-collection techniques, particularly interview and physical examination are used. The information that is gathered is directed at either supporting, refining, refuting or ranking the hypotheses.[2,12] An effective inquiry strategy and clinical skills are the fourth step in the CRP. The inquiry strategy includes the cognitive processes that select a particular question to be asked or physical exam item to be performed as well as their sequence. Clinical skills are the technical or psychomotor skills involved in interview and physical examination, as opposed to the interpersonal or communication skills. The skilled clinician can ask questions which affect the outcome of many hypotheses at a single time. A search and scan approach is generally employed. Search questions are designed to rank hypotheses already existing. This is basically the deductive reasoning process. Scan questions usually take the form of a functional inquiry. They are used to look for new information that might change the initial concept hypotheses of the patient's problem. They play only a minor role in the CRP. This is contrary to the myth that most physicians believe - that comprehensive data gathering, unrelated to specific hypotheses, is an important feature of the CRP. In fact, the more experienced clinicians come to correct conclusions about patient's problems using the least number of questions possible.[13] This is because maximization principles are used. These are "rules of thumb", which tend to rule in or rule out a large number of other possible hypotheses, therefore limiting the patient's problem to a workable size. A more formal approach is to use algorithms, which are standard approaches to certain problems thereby greatly reducing the number of steps required to reach a solution. The physical examination is used to confirm the possible hypotheses which remain likely after the interview has been completed. It is performed in a problem-oriented or search approach. Usually the clinician should know exactly what he is going to look for based on the hypotheses he is entertaining at that time. Routine items are comparable to scan questions.

As the data begins to accumulate, all of the relevant information is added to the initial concept. Thus a growing or evolving picture of the patient's problem is formulated. This is the fifth step in the CRP. This formulation at any given time encapsulates all the significant information obtained since the initial cues were perceived. The clinician must constantly adapt his formulation to any significant information he obtains. It is the absence of a problem formulation that causes students to recite endless amounts of data about findings when asked for a summary of the patient's problem.

The point of closure occurs when the physician decides either that all of the available information has been collected, that no further information is necessary, or that the patient's problem is urgent and requires immediate medical intervention. At closure the physician should have decided on the most likely hypothesis or hypotheses, whether any further inves-

tigations must be done, if intervention is necessary, and whether treatment will be medical or surgical. Closure represents the decision making process of the CRP.

Educational Implications

An essential question that must be answered is why the CRP is not taught in our curriculum. First, it is often said that the CRP is an "art",[14] the immediate implications being that it cannot be described, formulated consciously, and therefore taught. Second, our curriculum is traditional. The emphasis is on providing information with the student being expected to acquire the CRP on his/her own. Third, the CRP is more challenging to teach than "just the facts". Fourth, the steps in the CRP are very rapid and performed almost unconsciously so that physicians are largely unaware of them.[2] Finally, there is evidence to suggest that the CRP does not develop in undergraduate and postgraduate settings, but only when the physician is in practice and is forced by time constraints and the stress of full patient responsibility to organize the approach most efficiently. There are, however, methods available to teach the CRP.[2,4,5,6,7,8,9,10,15] At one extreme these methods are built into the curriculum, i.e., the problem-based curriculum at McMaster University. Specific methods being used include, 1) algorithm design, 2) concept definition and application, 3) taped interviews, 4) simple models, and 5) mathematical models. In a traditional curriculum such as ours the possibility of converting to a totally problem based approach is not feasible and possibly given the New Mexico experience not desirable.[16] Our challenge is to find a way of introducing programs for CRP development to the current program.

Algorithm of Multi-System Trauma Management

Surgical decision making represents a unique application of the CRP. In an emergency situation the surgeon does not usually have the luxury of time. This calls for a more efficient and effective CRP. An algorithm (Fig 2) with text is used to illustrate the basic CRP model (Fig 1). It was developed as part of a Behavioural Science Selective in Surgery which brought to our attention the importance of the CRP.

Clinical Reasoning In Multi-System Trauma: A Case Study

The case that is presented is the actual case of a 17 year old white male, involved in a motor vehicle accident (MVA). The appended diagram and description are oversimplified, however, the salient features and logical progression are accurate. The times at which major events occurred are indicated to allow the reader to appreciate the timing of the various steps.

A. 12:25 a.m. The emergency department was phoned. Dr. I. Soutter, heading the trauma team, was then notified. He notified the members of the necessary teams.

B. The patient was incoherent, and unable to provide a history, so the initial cues were provided by the ambulance attendant. The patient had been driving, was broad-sided, required extraction, had diminished alertness, was stable (BP 130/80, HR 108), was not bleeding externally, and had a laceration above his left eye.

C. 1:20 a.m. During the primary survey more initial cues were obtained allowing identification of life threatening conditions and simultaneous management. These are the "A", "B", "C" "D", and "E"'s of Trauma. The patient's *A*irway was clear; A/E was good bilaterally; the C-spine was immobilized; *C*irculation, clinically assessed was normal with no sign of exsanguinating hemorrhage. The rapid neurological examination (*D*isability (AVPU)) demonstrated that the patient was not fully *A*lert but responsive to loud *V*ocal and *P*ainful stimuli (i.e. was not *U*nresponsive). The patient was fully *E*xposed.

D. The initial concept was quite broad: young male, MVA victim, multi-system trauma, most injuries internal. This was developed quickly from the initial cues and stimulated the immediate generation of hypotheses.

E. In trauma management a logical head to toe framework is used within which hypotheses are generated. These hypotheses were; Head – fracture and/or diffuse brain injury; Neck – fracture (always suspected in any patient injured above the clavicle); Chest – internal injury; Abdomen – blunt trauma; Fractures – possible. Thus, there were many hypotheses of varying specificity. Since most of the injuries were internal there was a tendency to start with more general hypotheses and to refine them as the data was collected.

F. The problem formulation is an active, on-going mental process that represents a summary of the experiences of the encounter at that moment (2). For conceptual purposes the problem formulation box is represented separately. For practical reasons (too many arrows) it is left empty since it is actually represented in the text and in the clinical skills and inquiry strategies' box.

G,H,I. 1:30 a.m. These steps were commenced simultaneously. The clinical skills and inquiry strategy steps are represented in one box, because the patient could not talk. Since the hypotheses were processed in parallel, they are diagrammatically represented in parallel (I-T). The steps represented demonstrate the physician using a problem-oriented search strategy in a well-disciplined, logical approach. Short-cuts in data-collection procedures (i.e., CXR for all systems in chest), greatly increased the efficiency of investigation. Maximization principles such as standard algorithms of trauma management (i.e., N) also reduce the number of steps in problem solving. A mass of data started to acumulate. This was an exciting yet stressful time since most of the basic hypotheses were made but remained to be verified or ranked.

G. Management of problems identified in the primary survey was continued (ng tube). Shock-therapy was initiated (large bore iv, O_2, morphine, ECG). "Tubes and Fingers in every orifice," a scan approach was the basic rule.

H. A search approach to data collection was used.

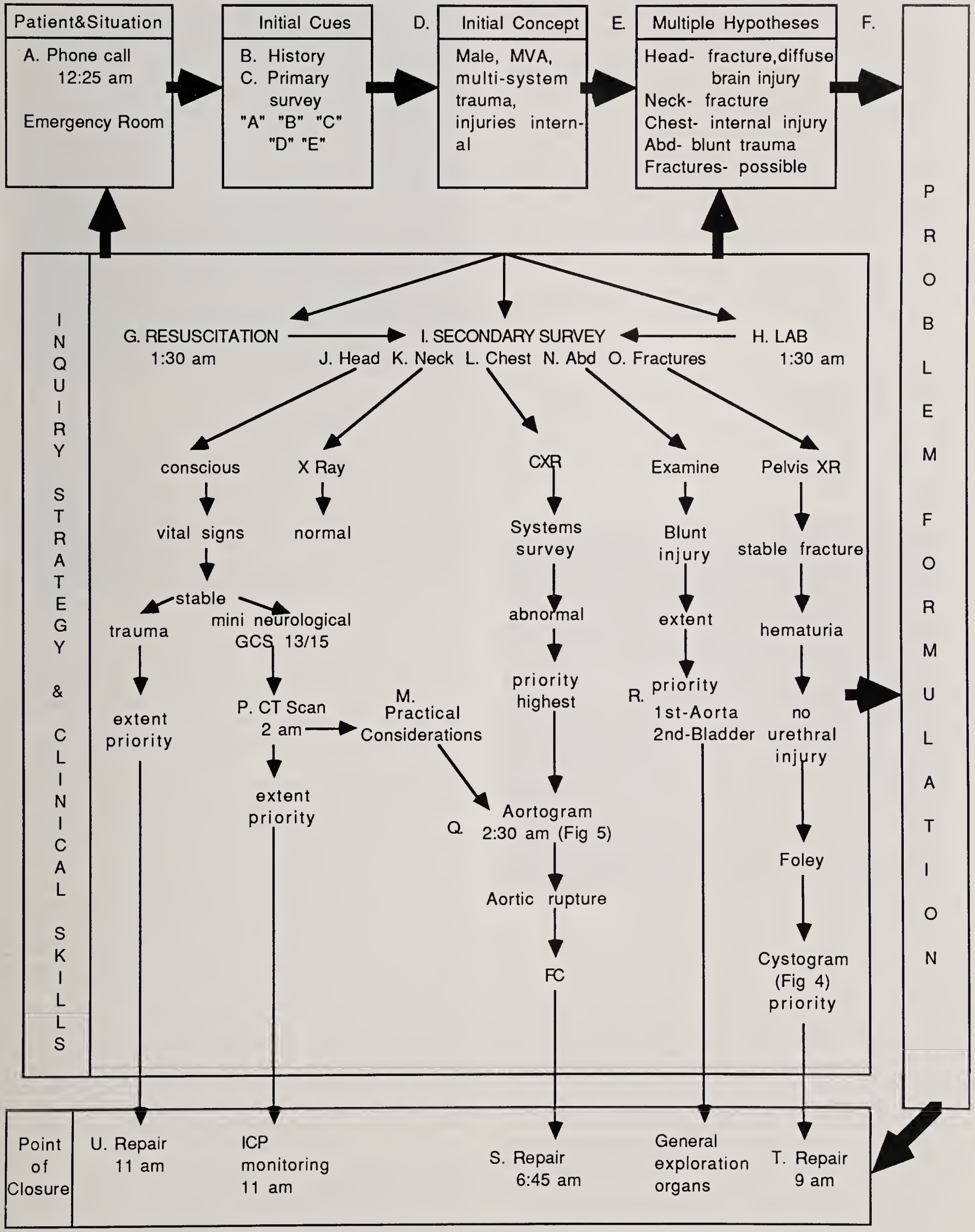

Fig 2: Application of the Clinical Reasoning Process

This included blood work, urinalysis and X-Rays (Fig 3-5). X-Rays of the chest, pelvis, C-spine and the cystogram were all performed in the trauma unit of the emergency department. The CT scan and the aortogram were performed elsewhere. These are discussed in the relevant sections.

I. The secondary survey is a head to toe evaluation (scan) utilizing the look, listen and feel techniques (search). Special procedures for patient assessment are also performed at this stage. The information was used to support, refine, refute, rank or generte new hypotheses which ultimately determined management (R-T). The relevant findings will be indicated in the text.

J. The cardinal sign of increased intracranial pressure is disturbance of consciousness. Scalp lacerations (a 5 cm laceration to the bone, on the forehead above left eye, not actively bleeding) are suspect for underlying injury such as fracture or skull depression. One-third of all patients with diffuse brain injury have elevated intracranial pressure. The patient showed decreased alertness and had a score of 13/15 on the Glasgow Coma Scale. Thus a CT scan was indicated (hypotheses redefined). However, other tests had to be performed first.

Figure 3: Chest X-ray

K. The lateral X-Ray of the C-spine was normal, ruling out the hypothesis that there was a problem with the neck.

L. The chest X-Ray (CXR) was taken next (Fig 3), which showed a wide mediastinum and the loss of visualization of the aortic knob. This suggested aortic rupture; however, an aortogram was required for confirmation and to rule out the possibility of venous bleeding. Thus a new set of hypotheses were generated and a search approach adopted. Traumatic aortic rupture is a common cause of sudden death after a MVA, being fatal approximately 90% of the time. (17) Rupture tends to occur at the ligamentum arteriosum. If not immediately fatal, it is often contained, with continuity being maintained by an intact adventitial layer. 50% of surviving patients will die each day if left untreated.

Figure 4: Cystogram

M. Practical Considerations. The CT scan was immediately available, and since it is preferable to do a CT-scan in the absence of contrast medium, it was performed before the aortogram.

N. The abdomen was examined clinically. There were no penetrating wounds. The abdominal findings included: abdominal distension, diffuse tenderness and rigidity, absence of bowel sounds and diffuse bruising over both anterior superior iliac spines. Thus there was evidence of blunt trauma. Normally a mini-laparotomy is indicated. However, since there was a high degree of suspicion arising from the CXR and the patient was stable, and since the pelvis and associated injuries were being worked up, the abdominal workup was delayed. This is a good example of parallel processing, with reference to the problem formulation.

O. The pelvic X-ray showed a fracture of the right anterior superior pubic ramus (Fig 4). The forces required for this fracture to occur are substantial. The fracture was assessed for clinical stability and since it was stable and the fracture was located anteriorly (not usually associated with major blood loss), the injury was given a low priority. Had this been an unstable pelvic fracture located posteriorly more serious action would have had to be taken. This is because these are very serious life threatening injuries associated with major blood loss. In this case pelvic stabilization, possible angiographic embolization and laparotomy to control the hemorrhage would have to be considered.

The bladder is often traumatized secondary to anterior pelvic fracture (new hypothesis rapidly generated through memory association). On examination, the urethra was not traumatized (new hypothesis, scan approach) prostate in normal position, no penile or scrotal swelling and no blood at meatus. A foley catheter gently inserted, demonstrated gross hematuria. A retrograde cystogram (search) showed vesical extravasation (Fig 4). This is a good example of the maximization principle standard approach. The bladder would have to be repaired, therefore a mini-laparotomy was not performed. Repair was delayed until after the aortogram.

Figure 5: Aortogram

P. 2:00 a.m. The CT scan was normal thus ruling out the hypothesis of unstable head injury.

Q. 2:30 a.m. The aortogram (Fig 5) showed a contained rupture just distal to the left subclavian artery. This injury took immediate priority. An excretory pyelogram was also performed and showed normal renal function bilaterally (scan test). The cardiovascular team was notified and the patient was taken immediately to the operating room at 3:30 a.m.

FC. The family was consulted on several occasions, for different reasons, by different physicians. Only one visit is indicated.

R. The operating room had to be set up, requiring approximately 3 hours. The biggest reason for the delay was that the cardiovascular surgeons wanted their own nurses, who had to drive in from Mississauga. In the meantime, the anaesthetists set up their many monitors.

S,T,U. These steps are the elements of the point of closure, which is very specific. The multiple hypotheses, processed in parallel and stored succinctly in the problem formulation allowed for the diagnosis of potentially life-threatening injuries and their prompt and prioritised management. The management of this case represents a most elegant and dramatic illustration of the importance of an efficient CRP.

S. 6:45 a.m. Surgical access to the aorta was through the 4th left intercostal space. The lung was deflated with a bronchial blocker. A large mediastinal hematoma was encountered. The aorta would have to be clamped, carrying a 5-25% risk of paraplegia. Resection of the injured area and grafting were chosen over direct repair because the aorta was widely dissected. Clamp time was 38 minutes, and only minor neurological deficits were sustained.

T. 9:00 a.m. A 6 cm tear at the neck of the bladder which had extravasated retroperitoneally was repaired. At the same time the other viscera were explored and no other significant injuries were found.

U. 11:00 a.m. The laceration of the forehead was cleaned and sutured. Since the patient showed some evidence of increased intracranial pressure and had also been under anaesthesia for an extended period of time, a Richmond Screw was inserted.

The patient remained for one week in the Intensive Care Unit and was discharged three weeks after that.

Conclusion

The clinical reasoning process has been analysed. It can be taught and evidence suggests it will increase clinical performance. Traditional curricula neglect the CRP. Our education is therefore, compromised. It is our challenge and responsibility to find ways to incorporate new programs into the curriculum. The Behavioral Science Surgical Workshop, which provided the basis for this paper is one such attempt, which was very exciting and extremely rewarding for all those involved.

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Treatment of the Acute Knee with Anterior Cruciate Ligament Damage

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Abstract

Treatment of the acutely impaired knee with laxity due to anterior cruciate ligament (ACL) damage is a subject of much controversey. A retrospective study was carried out utilizing 79 patient charts from the Sunnybrook Medical Centre covering the nine years between 1977-85. The subject of the project revolved around knee injuries where at least the ACL was damaged. The goal of this study was to develop a protocol that would allow prospective documentation of knee injuries and evaluate it by retrospectively reviewing each of the 79 patients in question, in particular looking at the mode of treatment, surgical or non-surgical. This study has confirmed that the committment to athletic activities, the mode of injury, the age of the patient and the degree of laxity of the knee after injury all play as major factors in determining the type of treatment given for the acute ACL injury of the knee. Specifically, this study showed that 67 per cent of the injuries were caused by a sporting activity and that in the majority of the cases these were treated surgically. It was also shown that surgery of the disrupted ACL was conducted 80 per cent of the time on Grade III injuries but only 17 per cent of the time on the less lax Grade II injury and that surgery was the preferred procedure for the younger patient.

Introduction

Treating ligamentous knee injuries, especially the anterior cruciate ligament (ACL), has long been an issue of controversy. Many advocate the need for immediate surgery while others prefer the wait and see approach of non-operative management.

Figure 1 illustrates the anatomy of the normal knee.

The functional importance of the ACL has been identified, disputed and re-emphasized over tha past 50 years.[1,2,3,4,5] The literature is replete with evidence supporting its importance and describing the disability experienced by patients with this laxity. If left untreated the ACL deficient knee will develop meniscal tears, joint cartilage degeneration and functional instability, which in turn causes an increase in the incidence of new meniscal lesions.[6,7] Fetto and Marshall[8] determined that the ACL deficient knee suffered marked deterioration, complicated by peri-articular degenerative changes and increasing functional disability. Marani, et al[9] produced similar findings for the knee that was treated conservatively.

Noyes and McGinniss[10] also found knee deterioration in patients with moderate to severe instability who lacked an appropriate diagnosis, activity modification and rehabilitation program. Because it is often not possible to reliably predict which patients will or will not improve, they felt it advisable that all patients initially

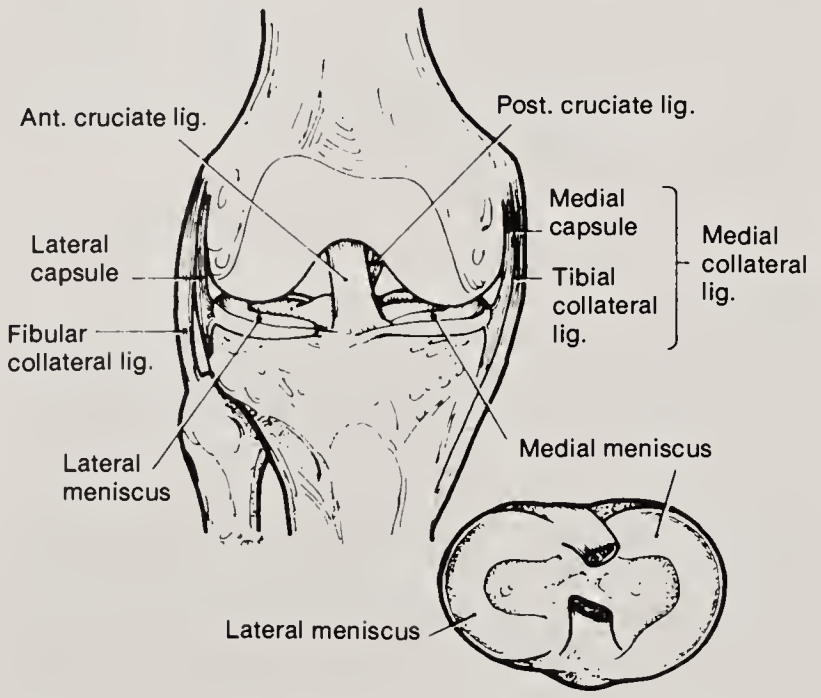


Figure 1. Anatomical Features of a Normal Knee. Lig denotes ligament, ant. anterior, and post. posterior.

Taken from the New England Journal of Medicine.

enter a rehabilitation program. Noyes and McGinniss also felt it necessary to reserve surgical reconstruction for patients who have functional disability and are unwilling to alter their athletic lifestyle or for those who have symptoms with activities of daily living. However, these authors were quick to point out that successful, permanent surgical correction for laxity is still elusive. This reflected their belief that there is currently no predictably successful reconstruction procedure that allows surgery to be routinely recommended for other than significant functional disability. Regarding conservative management, these authors presented their "rule of thirds"; that one-third of the patients with this injury would compensate adequately and be able to pursue recreational activities, one-third would be able to compensate but would have to give up significant activities and one-third would do poorly, and would probably require future reconstructive surgery, where the intended goal would be to prevent recurrent episodes of instability and thus decrease the rate of articular deterioration.

From a different point of view, Palmer[12] reported good results after repairing the acutely torn ACL with an early primary suturing procedure, however, Salonen and Rakkanen[13] and Odensten et al[14] reasoned that only 50 per cent of their patients met with success with early repair of the ACL. Odensten et al[15] recently concluded that early primary suture with augmentation may give the patients with an acutely torn ACL a better start than conservative treatment. Feagin and Curl[16] after reviewing 32 primary repairs of ACL also concluded that an ACL tear may lead to progressive deterioration of the joint and that the primary ligament repairs were inadequate without augmentation.

As shown by the diversity of these results, opinions concerning the treatment of the acutely torn ACL clearly vary. It is the purpose of this study to create a protocol that can be used for the evaluation and characterization of the injured knee and then to use this in the analysis of 79 patients so that a study comparing the end results of the surgically and conservatively treated knee can be undertaken.

Method

The available medical charts of patients who had suffered a ligamentous knee injury involving at least the ACL from the Sunnybrook Medical Centre, covering the nine years between 1977 to 1985 were reviewed. Seventy-nine patients, 60 men and 19 women were included in the study. Arthroscopy, examination under anaesthesia and/or clinical evaluation showed that all these patients had at least a disruption of the ACL with the majority of the patients showing other ligamentous or meniscal damage also.

Ligament injury was classed as mild or Grade I, in which there was no instability and the tear was only partial or interstitial; moderate or Grade II, associated with mild instability but in which secondary supporting structures were intact; and severe or Grade III, with complete rupture of the ligaments and gross instability of the joint.

The protocol developed for the purpose of this study was then utilized to characterize all the patients based on such things as sex, mode of injury, the injury itself, surgical or conservative treatment, etc., thus allowing specific comparison to be made using the patients and their various characterization as seen on each patient's protocol.

Results

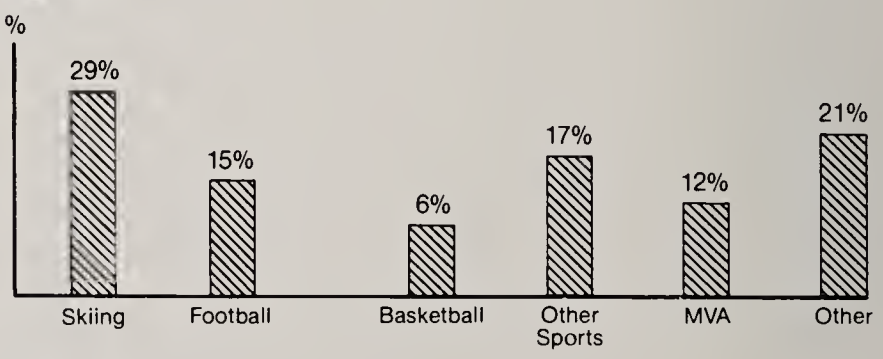
The protocol developed for this study has utilized much of the work, with some modifications and additions, presented in studies from Marshall, et al,[17] Noyes, et al,[11] and Noyes and McGinniss.[10] Once completed, this protocol was used to produce a series of figures, presented as Figures 2-6 that helped to characterize the population of patients who were dealt with.

Discussion

An ACL tear is a significant injury with the presentation of arthrosis secondary to recurrent giving-way and re-injury being the primary concern. Moyes, et al[11] have shown that the risk of progression of the hallmark symptoms of pain, swelling and giving-way is great in patients who remain athletically active. The anterior drawer/pivot shift subluxation of the tibia elicited at the examining table with minimal force is easily reproduced by the athlete on the field during aggressive cutting, vigorous jumping or rapid deceleration under much higher physiologic conditions of joint loading. Repeated subluxation episodes under weight-bearing conditions may significantly damage the joint, resulting in articular cartilage defects, meniscal tears and stretching of secondary capsular and ligmentous restraints. This sequence, if not interrupted, will result in progressive deterioration of the joint and too often leads to arthrosis in a young patient.

Noyes and McGinnis[10] suggest that the patient's

Figure 2A:



MVA = motor vehicle accident

Figure 2B:

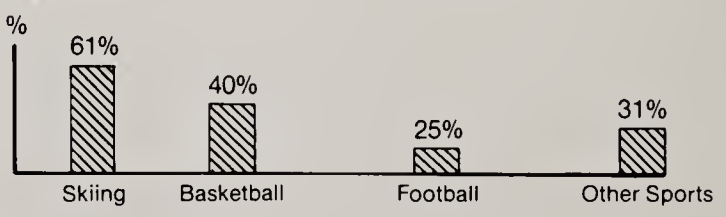


Figure 2:
A Mode of Injury
B Percentage of injuries in various sports treated conservatively.

future athletic and recreational goals be carefully weighed. For the person who is not athletically inclined or who is willing to give up strenuous sports, no surgery should be recommended. Differences between individual patients determine who is able to compensate for an anterior cruciate laxity. Noyes et al[11] suggest that the activity level desired by the patient, the willingness to modify activities to avoid re-injury and the extent of the initial and subsequent damage to the cartilage surface and menisci provide a general profile of the patient's future course. In their study, the patients who continued athletics despite re-injury literally destroyed their knee joint over a period of months to years.

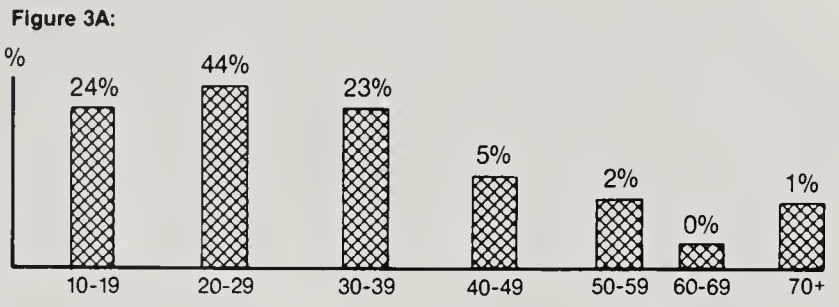
The athlete who is unwilling to modify athletic activities is a candidate for surgery, for these authors[10] believe that only a small percentage of exceptional athletes with ACL insufficiency are capable of returning to twisting, cutting and jumping sports where the risk of re-injury is very high. Based on this criteria it was felt that the primary indications for surgery in an acute injury is anterolateral rotatory subluxations in the athletically active individual who is unwilling to modify sports participation.

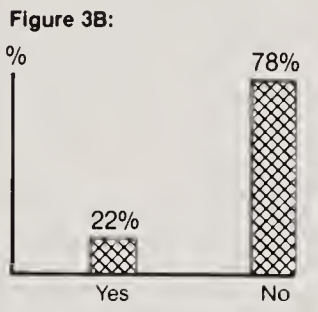
Figure 2A gives a breakdown of the mode of injury that resulted in disruption of the ACL in the 79 patients studied. As can be seen from this figure, 67 per cent of those injured were injured while participating in a sports event. Figure 2B reveals that the majority of these injuries were dealt with surgically except for those injured while skiing where 61 per cent were treated conservatively. However, it should be pointed out that of this 61 per cent, 33 per cent had suffered a Grade II injury of the ACL which, as shown in Figure 5B is usually treated conservatively with no operative procedure being performed on the ligament itself. It should be safe to assume that those who were treated conservatively most likely were willing to modify their athletic committment rather than to be treated surgically or to at least see how their knee held up after conservative management.

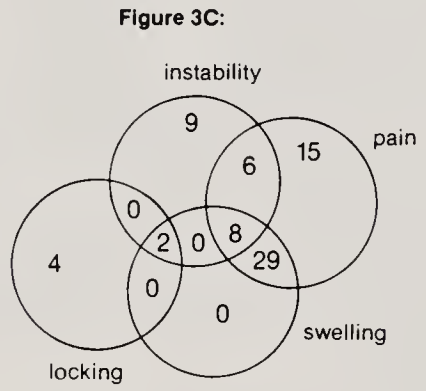
Noyes and McGinniss[10] suggest another criteria for surgery, that being when an acute meniscal repair is required and the added stability provided by a repaired ACL is judged to be beneficial. In this study all knees that had meniscal injuries were operated on to deal with this meniscal lesion and 67 per cent of the knees presenting with a Grade III injury of the ACL had the ACL repaired during the surgery.

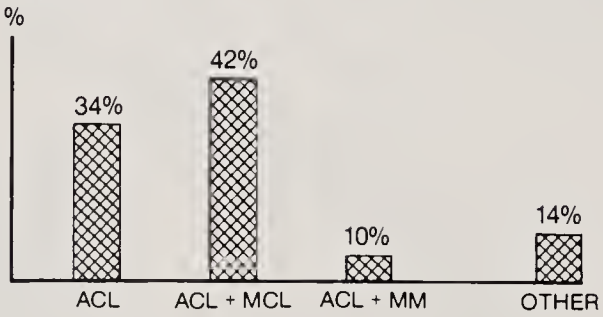
Figure 3A shows the breakdown of the patients injured. As can be seen the greatest frequency of occurrence is for the age group in the range 20-29 years old. Under most circumstances this is the age group that is most active in athletics and other such related recreational activities, followed next by the age groups in the range 10-19 and 30-39. As was shown in Figure 2, athletic-related injuries were responsible for 67 per cent of the injuries where the ACL was disrupted. This falls in well with the frequency of injuries of the various age ranges. The age distribution is also important in considering the mode of treatment. Figure 6A reveals a bar graph showing the way the patients were treated, surgically or conservatively, based on their age. The preference drifts from surgical for the younger patients to conservative management as the injuries occur in patients in the older age groups. Hence, it can be seen that the committment to athletic activities, the mode of injury and the age of the patient will all tend to play as major factors in determining the mode of treatment given for the acute ACL injury of the knee.

The hallmark signs and symptoms of an injury that has damaged the ACL are: a loud "pop" heard by the patient followed by the symptoms of pain, swelling and









ACL = Anterior Cruciate Ligament
MCL = Medial Collateral Ligament
MM = Medial Meniscus

Figure 3: Characteristics of the patients
A Age distribution.
B Was a "pop" heard at the time of injury?
C Chief complaint at the time of injury.
D Injury summary.

ligaments and the menisci being involved in the injury. Noyes et al[11] suggest the necessity of treating associated injuries that may be present even when non-operative treatment is selected for the laxity of the ACL. This motto has obviously been adhered to regarding the patients in this study. Figure 4A shows that 59 per cent of all the patients went to surgery but as shown in Figure 4B, 28 per cent of these did not actually have an operative procedure carried out to repair the ACL. The ultimate decision to be made obviously lies in the surgeon's assessment of the situation and what he feels would best serve his patient. Reasons for not

instability (giving-way). Figure 3B shows that the loud "pop" may often not be heard at all and that the patients claim to having heard it should be considered a bonus in helping to make the diagnosis of an ACL injury, but should not be held as the major investigative finding. More common is the triad of symptoms. As shown in Figure 3C, 69 of the 79 patients had at least one of these symptoms, six came in with associated symptons of locking, most characteristic of meniscal tears. The remaining not accounted for came to the hospital in a condition such that no chief complaint was attainable.

Figure 3D yields a summary of the injuries sustained by the 79 patients; 34 per cent had an isolated ACL injury while 42 per cent had a combined ACL and a medial collateral ligament injury; 10 per cent had an ACL and a medial meniscal injury, with the remaining being of various combinations of the four main knee

Figure 4A:

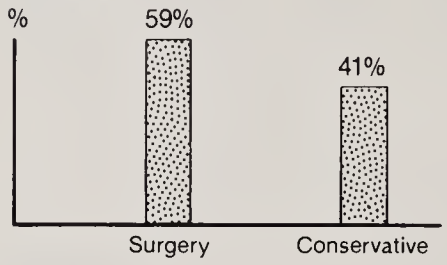


Figure 4B:

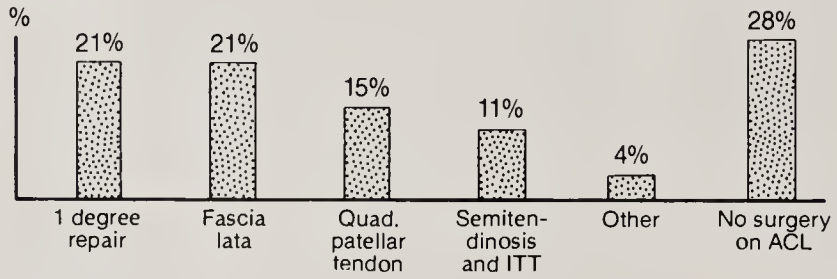
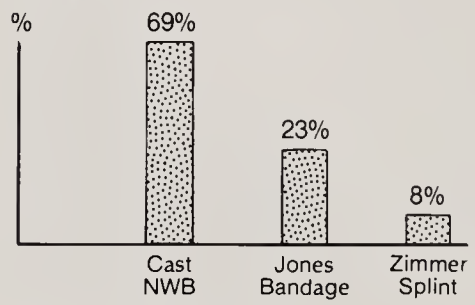
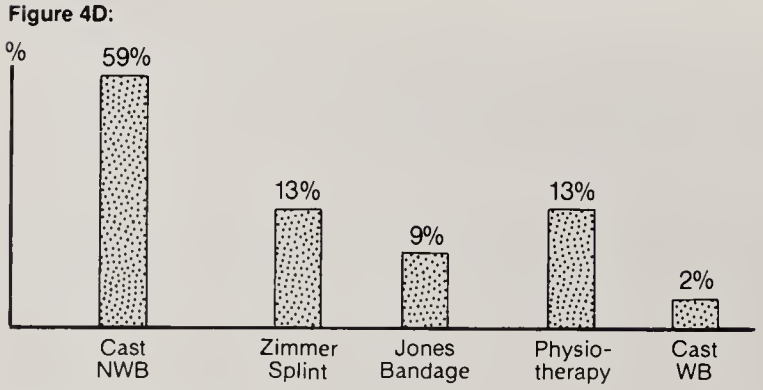


Figure 4C:



NWB = Non-weight bearing

Figure 4D:



NWB = Non-weight bearing
WB = Weight bearing

Figure 4: Treatment Analysis
A Node of treatment applied.
B Mode of surgery used to repair the ACL.
C Post-operative treatment of patients who had surgery but did not have their ACL repaired.
D Mode of conservative treatment carried out.

repairing the ACL while performing an operative procedure could lie in the means by which that procedure was conducted. As previously mentioned all knee injuries with meniscal tears were operated on; however, not all these knees had had an operative procedure carried out on the ACL. This could have been because the meniscus was dealt with through an arthroscope and the surgeon did not feel the need to perform an arthrotomy. Figure 5A reveals that 89 per cent of the surgery performed was on ACL injuries of the Grade III variety while only the remaining 11 per cent were on those of the Grade II variety. A Grade III injury reveals much greater laxity of the knee due to the ACL injury than does a Grade II injury. Figure 5B goes further to reveal that of all the Grade III injuries that went to surgery 80 per cent actually had an operative procedure done to repair the ACL while of all the Grade II injured knees that went to surjery only 17 per cent actually had an operative procedure done to repair the ACL. So clearly one of the major points of discretion used by the orthopaedic surgeon regarding performing an operative procedure on the ACL is the degree of laxity, where it has been shown that he is more willing to operate on Grade III rather than on a Grade II ligament laxity.

Figure 5A:

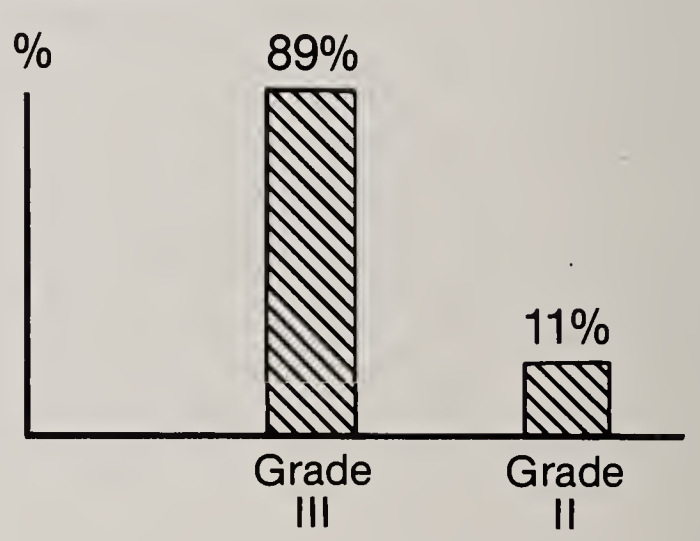


Figure 5B:

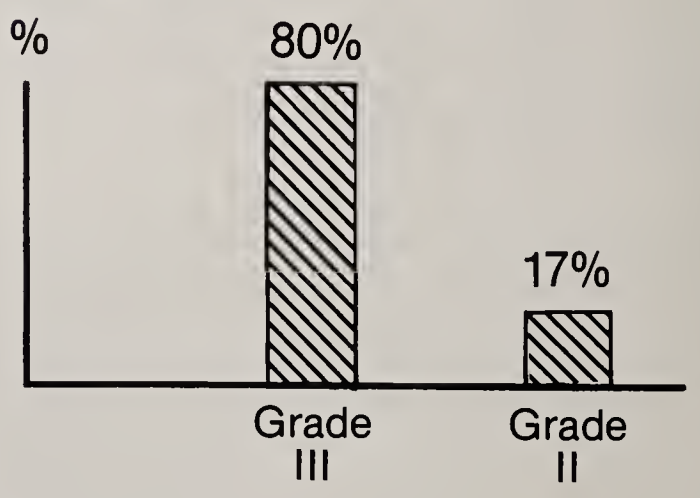


Figure 5:
A Grade of ACL injury that went to surgery as a percentage of total surgery.
B Knees that went to surgery where repair of the ACL was done as a percentage of all Grade III and II injuries that went to surgery.

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Figure 6A:

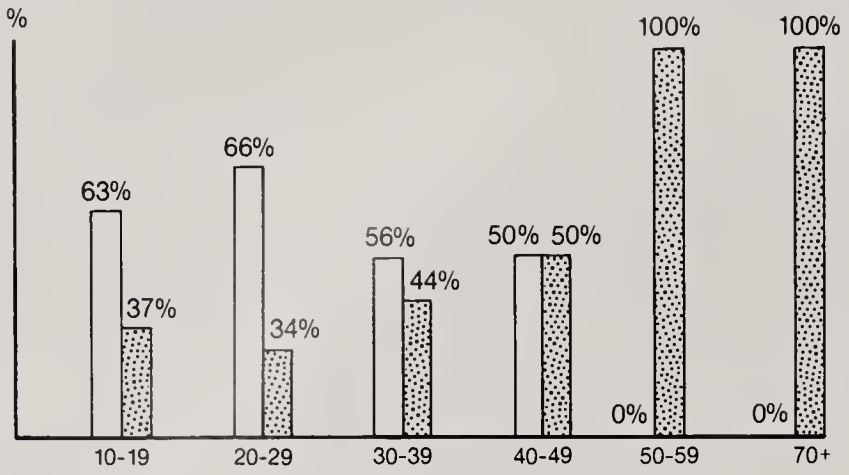

Figure 6B:

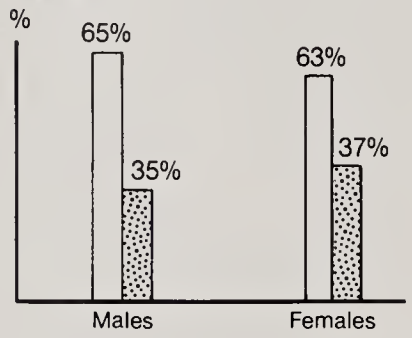

Figure 6C:

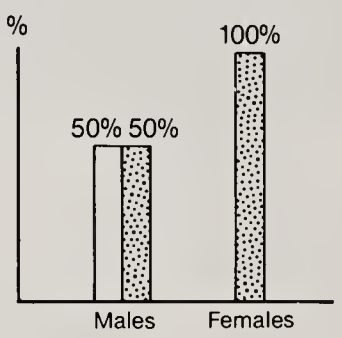

Figure 6: Mode of treatment based on:
A Age.
B Sex for Grade III injury of the ACL.
C Sex for Grade II injury of the ACL.

Figures 6B and 6C go further in comparing the mode of treatment based on grade of injury but this time also taken into consideration is the gender factor. Figure 6B reveals that for a Grade III injury, 65 per cent and 63 per cent, for males and females respectively, the preferred choice is surgical treatment. However, for a Grade II injury there is a greater difference in the treatment regimen where surgical treatment was conducted on 50 per cent of males but on none of the females, who opted for a conservative approach instead. The reason for this could have been a coincidence where it so happened that the females were those with Grade II injuries who were treated conservatively or it could be also reasoned that the females were more willing to try a conservative mode of treatment for the less lax knee of a Grade II injury, whereas the males were less willing to compromise their activities as dictated by such an injury, even though the compromise dictated by a Grade II injury is far less than that dictated by a Grade III injury that is treated conservatively.

Figure 4D reveals the mode of conservative treatment given to patients who did not have surgical intervention. By far the most common means was a non-weight bearing cast, with alternative treatment via a Zimmer splint, Jones bandage, physiotherapy and weight bearing cast also being used as shown. Figure 4C shows the post-operative treatment given to patients who went to surgery but did not have an operative repair done to their ACL. Again, the non-weight bearing cast is the most prominently used modality. When surgery was conducted where the ACL was repaired the usual mode of post-operative care was also a non-weight bearing cast. However, Salter et al[18] have reported that when replacement of the medial collateral ligament with semitendinous tenodesis was carried out and continuous passive motion (CPM) was used as the initial post-operative procedure, rather than a cast, the strength of the repair had increased at six and 12 weeks. It is possible that similar results may be obtained for such repairs of the ACL with CPM; this is for the future to tell.

Conclusions

Throughout the course of its body, this paper was committed to the analysis and comparison of patients who had acute knee injuries involving at least a disruption of the ACL. A protocol was created for the purpose of this endeavour. Well entrenched in the goal of this study was to further analyse the mode of treatment carried out on the patients. Various opinions regarding this topic have been presented and the arguments for both the advocates and adversaries of both the surgical and conservative treatments have been acknowledged. In this part of the study the patients' charts were summarized, various comparisons made, and a series of observations pointed out. Most notable of these were that the committment to athletic activities, the mode of injury, the age of the patient and the degree of laxity of the ensuing knee after injury will all play as major factors in determining the mode of treatment given for the acute ACL injury of the knee, be it surgical repair of the ACL, surgery of the knee with no operative repair to the ACL or conservative management. This completes the goals of this study. Further work will take what has been learned and further elaborate on this injury by looking at the follow-up studies of these same patients so that an assessment can be made regarding such topics as the effects on walking, recreational sports, strenuous sports, pain, swelling, giving-way, etc. At that point in time an accurate assessment can be made regarding the end result of surgical management of the acutely injured ACL with regard to the symptoms and thus help in settling this agelong dispute.

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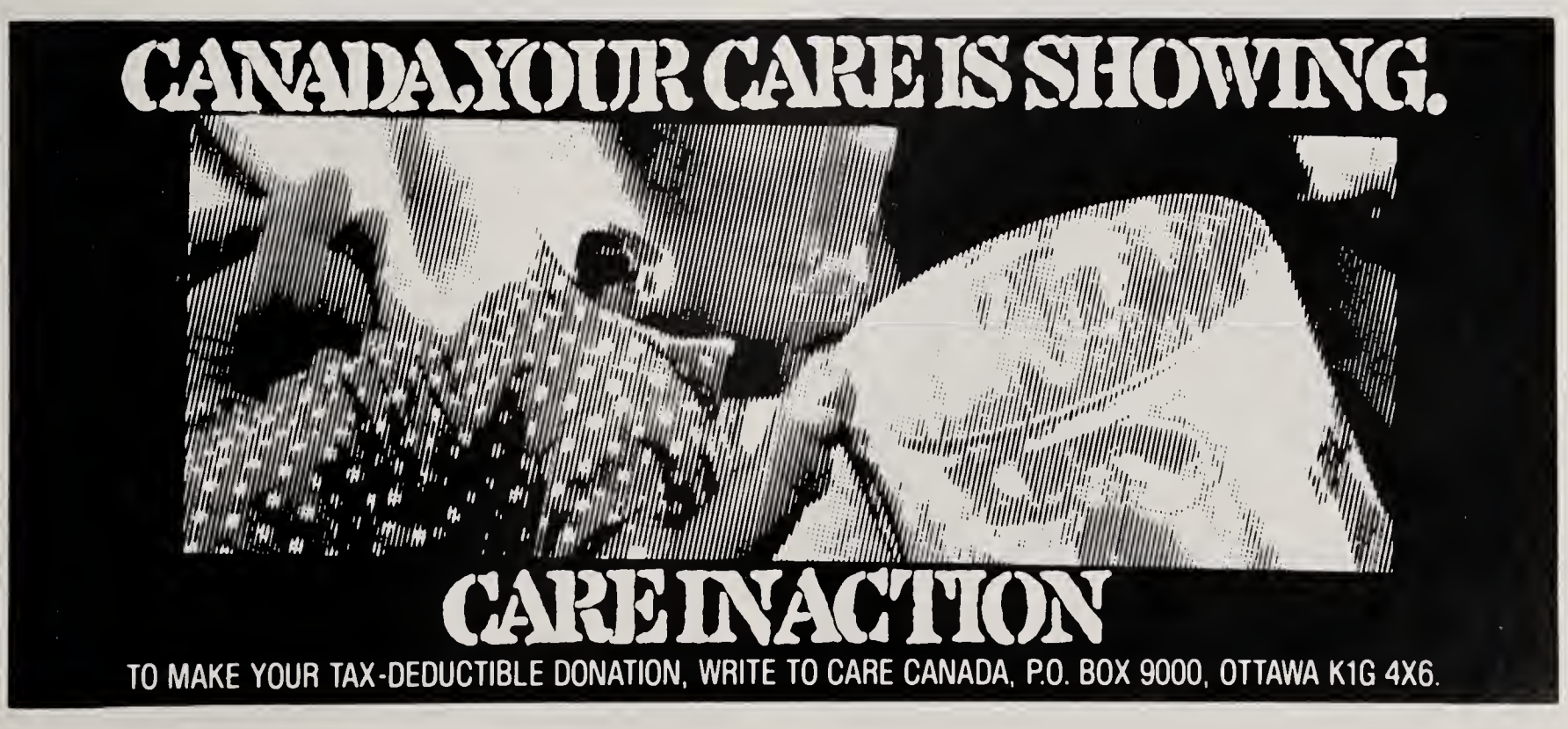
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Pulmonary Infiltrates and Eosinophilia

Jody Lewtas M.D., Robert H. Hyland M.D., F.R.C.P.(C),
Michael A. Hutcheon M.D., F.R.C.P.(C), Robin R. Gray M.D., F.R.C.P.(C)
The Departments of Medicine and Radiology, The Wellesley Hospital

Question

A sixty-seven year old woman was admitted for investigation of an abnormal chest radiograph.

She had been healthy until four weeks prior to her admission when she developed fever, chills, night sweats, myalgias, a sore throat and a dry cough. She was started on erythromycin by her family doctor; however, this afforded her no relief. In fact, the fever and cough worsened. She presented to the Emergency Room at another hospital. A chest x-ray done there was felt to be suspicious of metastatic carcinoma, and she was transferred to a tertiary care hospital for further investigation. She had had no previous history of asthma or other lung disease. She denied dyspnea, chronic cough, hemoptysis, chest pain or weight loss. She had a 40 pack year smoking history, and had quit seven years previously. She had recently returned from the Grenadines, but had not been ill there.

Figure 1: The PA chest film during the acute illness shows multiple areas of upper lobe airspace consolidation, most of which are, located peripherally.

On physical examination she was noted to be coughing. Her temperature was 38°C, heart rate 96, blood pressure 150/70 and respiratory rate 15. There were some fine inspiratory crackles heard over the left mid lung field posteriorly. Her examination was otherwise unremarkable. The hemoglobin was 123 g/dl, WBC 13.4 x 10^9/L (60% polymorphonuclear cells, 10% lymphocytes, and 30% eosinophils), and platelet count 800 x 10^9/L. The ESR (erythrocyte sedimentation rate) was increased at 117 mm/min. Her sputum failed to grow any pathogens apart from normal flora, and her blood cultures were similarly negative. Cold agglutinins, viral titres, and complement fixation tests for aspergillus, blastomycosis, coccidiomycosis, cryptococcosis and histoplasmosis were also negative as were stools for ova and parasites. Her chest radiograph is shown in Figure 1.

Diagnosis: Chronic Eosinophilic Pneumonia

Chronic Eosinophilic Pneumonia (CEP) typically occurs in middle aged women. It presents with fever, night sweats and a cough - even hemoptysis and is commonly associated with a recent onset of asthma. It may be confused with pulmonary tuberculosis. In approximately two thirds of cases there is a peripheral

Figure 2: After steroid therapy, the consolidation has cleared and the chest is normal.

blood eosinophilia, and the ESR is usually elevated. Patients are often hypoxemic with an increased alveolar-arterial PO_2 gradient. The chest radiograph is characteristic for the disease. Dense opacities which do not follow anatomic segments are located peripherally against the pleura. This pattern has been described as "the photographic negative of pulmonary edema". Lung biopsies from patients with CEP reveal both an alveolar and an interstitial infiltrate. Not surprisingly, eosinophils make up the majority of infiltrating cells. Histiocytes and lymphocytes can also be present.

The diagnosis of CEP can often be made clinically based on history, peripheral eosinophilia and a typical chest radiograph. Lung biopsy is seldom necessary and the diagnosis is often confirmed by the dramatic radiological and clinical response to steroid therapy. A relatively non-invasive method of making the diagnosis, particularly when peripheral eosinophilia is lacking, is the demonstration of a very high proportion of eosinophils in the alveolar washing obtained by bronchoalveolar lavage.

CEP is one of the diseases in the broader classification of pulmonary eosinophilia (Table 1). Pulmonary eosinophilia can be either transient or prolonged. The transient variety is also known as Loffler's syndrome and is characterized by minimal or no symptoms, blood eosinophilia and peripheral infiltrates radiographically which often migrate. All symptoms and signs of disease resolve within a month. In fact, Loffler's syndrome is often discovered as an incidental finding on routine annual radiographs, and it requires no treatment. Often no cause is found, although it may be associated with a parasitic infestation, especially Ascaris lumbricoides, as well as the administration of certain drugs such as aspirin, penicillin, and sulfonamides

TABLE 1

Pulmonary Eosinophilia
- A. Transient
  - Lofflers Syndrome
- B. Prolonged
  - Tropical Eosinophilia
  - Pulmonary Eosinophilia with Asthma
  - Polyarteritis nodosa
  - Drug-induced
  - Chronic Eosinophilic Pneumonia

On the other hand, prolonged pulmonary eosinophilia is a more severe process, and has been subclassified according to etiology. For instance, tropical pulmonary eosinophilia is associated with parasitic infestation – most notably filariasis. The chest radiograph in this syndrome shows diffuse bilateral interstitial infiltrates.

Asthmatics often present with eosinophilia and an infiltrate on their x-ray. Usually the infiltrate represents a pneumonic process or mucous plugging, however, in a small percentage of asthmatics with eosinophilia and recurrent upper lung field peripheral infiltrates the diagnosis of Allergic Bronchopulmonary Aspergillosis should be made. The patient may cough up brown plugs which are loaded with Aspergillus mycellia. In addition to blood eosinophilia other hallmarks of this disease include; high serum IgE, serum precipitins to Aspergillus, and a positive Type III skin test to Aspergillus. This condition responds dramatically to steroids, but the hypersensitivity reaction to the Aspergillus in the airway mucosa may lead to proximal bronchiectasis.

When bronchospasm occurs in the setting of eosinophilia, pulmonary infiltrates and evidence of a systemic vasculitis, it is known as Churg-Strauss Vasculitis. Polyarteritis nodosa also causes a pulmonary eosinophilia when it involves the lung. In addition, many drugs can induce a prolonged pulmonary eosinophilia; nitrofurantoin, penicillin and aspirin are examples. Finally there remains Chronic Eosinophilic Pneumonia with no clear etiology.

The treatment of CEP is extremely rewarding. Because this patient's clinical picture was so consistent with CEP, it was decided to treat her accordingly without confirmation by lung biopsy. She was given 40 mg. of Prednisone daily. Within two weeks her chest radiograph had improved, her ESR dropped and the cough was clearing. Her radiograph only one month later was back to normal (Figure 2). She was weaned from the steroids after two and a half months of therapy, and she has not suffered a recurrence of her disease in six years. In this regard she is somewhat unusual as often more prolonged therapy is required to prevent relapse.

Figure 3 represents another similar case of CEP before and after therapy with steroids. This case was also associated with peripheral eosinophilia (25%) and demonstrates nicely the distinctive peripheral infiltrates.

Figure 3A & B: In another patient, one sees a similar appearance of nonsegmental, peripheral upper zone areas of consolidation (A), which cleared with steroid therapy (B)

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Patient Simulator II: An Overview

Charles Cheng, 9T0

Patient Simulator II
Knowledge House Publishing Ltd.,
3845 Dutch Village Road, Suite 201
Halifax, Nova Scotia, B3L 4H9
Tel: (902) 455-1962
Cost: US$500.00 (Demo Disk $10.00)
Hardware requirement: MacIntosh Plus or IBM PC 640K, two 360K disk drives, DOS 2.0 or later, graphics card, mouse optional

Overview

Patient Simulator II (PSII) is basically an educational tool for Medical students and practising physicians. It allows them to apply their knowledge and organizational skills in the management of a simulated patient, based on real-life cases. In addition to the twenty-four simulated cases available, individual clinical teachers may wish to author their own simulations. This can be done by using another package called ContentWriter (available for the Mac, cost?). PSII provides feedback by :1) giving "expert" advice; 2) warning the user of any critical judgement errors; 3) interpreting any history responses, physical examinations and study results (if requested); 4) comparing management costs, differential diagnoses given, and critical management with that of the "expert" at the end during the stage called Evaluation; 5) constant monitoring and display of the patient's vitals over time, while responding to various history questions, physical examinations, or lab requests.

The initial presentation of the patient gives the patient's chief complaint and indicates the medical facilities available to the physician. The elapsed simulated time and the location of the patient are always displayed on two boxes located at the top left corner. The elapsed time changes accordingly with the actual time that would be required by a physician in real life for a procedure (i.e. a physical exam takes a few minutes). The state of the patient also changes realistically with the passage of time. There is a vitals window which displays the body temperature, pulse, respiratory rate, and blood pressure with the option of graphing each of these versus time. On the menu bar we have HISTORY, PHYSICAL, STUDIES, TREATMENT, LOCATE, CHART, and HELP. Each option is self-explanatory

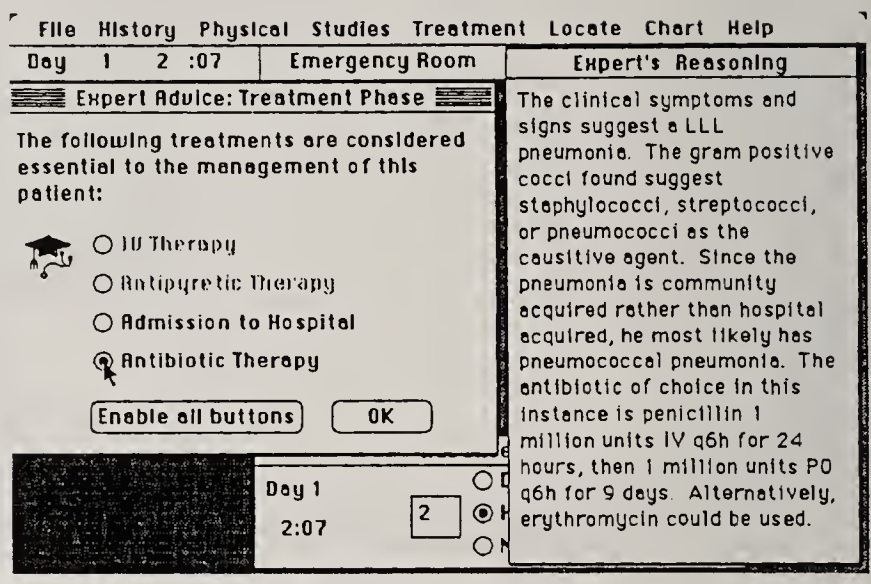
File History Physical Studies Treatment Locate Chart Help
Day 1 2 :07
Emergency Room
Expert's Reasoning
Expert Advice: Treatment Phase
The following treatments are considered essential to the management of this patient:
IV Therapy
Antipyretic Therapy
Admission to Hospital
Antibiotic Therapy
Enable all buttons
OK
The clinical symptoms and signs suggest a LLL pneumonia. The gram positive cocci found suggest staphylococci, streptococci, or pneumococci as the causitive agent. Since the pneumonia is community acquired rather than hospital acquired, he most likely has pneumococcal pneumonia. The antibiotic of choice in this instance is penicillin 1 million units IV q6h for 24 hours, then 1 million units PO q6h for 9 days. Alternatively, erythromycin could be used.
Day 1
2:07
2

Figure 1: Expert advice in treatment by antibiotic therapy and his/her reasoning.

except in HELP, where Expert Advice and Advance clock are available. Under Expert Advice, the user may be advised on history, physical, lab results (called "Studies"), treatment and the proper order of management (figure 1). The user may also advance the clock. For example, if some lab tests were ordered and the user decided to take no further steps until the results returned, he may advance the clock so no real time is wasted. The system is packed with such details making simulation as realistic as possible. Under HISTORY, you have the choice of general history, EENT, Neuro-Psychiatric, Cardiopulmonary, GI, GU /Gyn, MSK or Skin. With each choice, you have a number of questions you may choose to ask. For example, under Cardiopulmonary, you have the options: Chest Pain, SOB, Palpitations, Calf Pain, Edema, Cough, Sputum, Fever/-Chills, Sweating Episodes, and Cyanosis. Furthermore, under Chest Pain, you may find out about Character, Severity, Location/Radiation, Onset/Duration, Frequency, Aggravating Factors, Relieving Factors, Associated Symptoms, or Similar Episodes. Within the PHYSICAL window, you are allowed to select the examination method and the area for examination (see Figure 2). Under TREATMENT, the Drugs option allows you, after selecting the drugs (the system can recognize both generic and trade names), to select dosage, route, frequency, and duration (figure 3). In

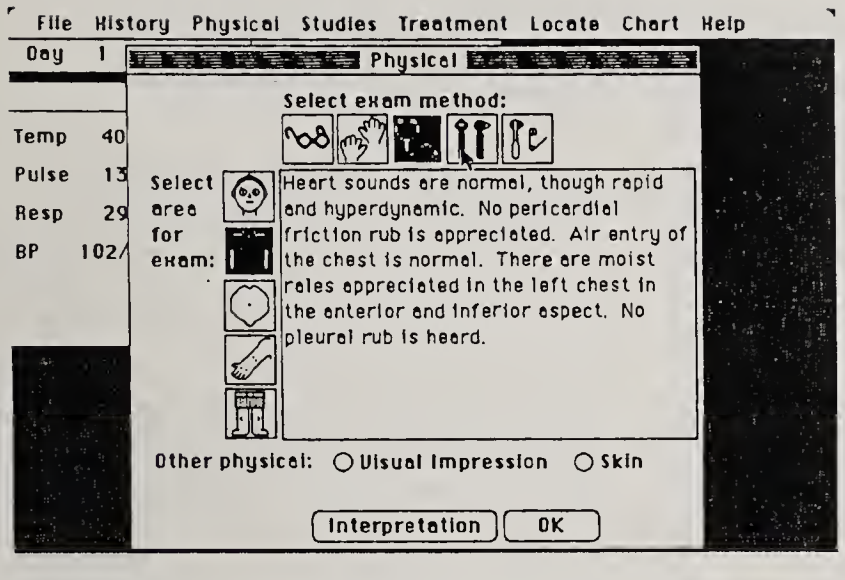
File History Physical Studies Treatment Locate Chart Help
Day 1
Physical
Select exam method:
Temp 40
Pulse 13
Resp 29
BP 102/
Select area for exam:
Heart sounds are normal, though rapid and hyperdynamic. No pericardial friction rub is appreciated. Air entry of the chest is normal. There are moist rales appreciated in the left chest in the anterior and inferior aspect. No pleural rub is heard.
Other physical: Visual Impression Skin
Interpretation
OK

Figure 2: In PHYSICAL, you select the method of examination to examine the area of your choice.

LOCATE, you may move the patient to an ICU, CCU, ward, home (i.e. discharge) or any others as indicated by the extent of the hospital's facilities. In the end, an evaluation is done by comparing the steps the user took with what an expert would have done. PSII cannot decide whether or not the user's approach is correct. It can only remind the user when steps were taken that would have put the patient's well-being in danger.

Overall, this piece of software is very impressive. It should be considered one of the best patient simulation programmes on the market. The real time simulation clock gives an additional touch of realism to the programme. I did however feel that the physical exam section should be more area-specific. For example, in the palpation of the abdomen, instead of giving the entire exam results, one should be able to specify which part or organ is to be examined for which sign (e.g. hepatomegaly). It should also be noted that the quality of the simulation depends on the author of the simulation. With ContentWriter, one is able to design a simulation suited to his or her need. It is most likely that PSII will receive a warm welcome from both medical students and the teaching faculty.

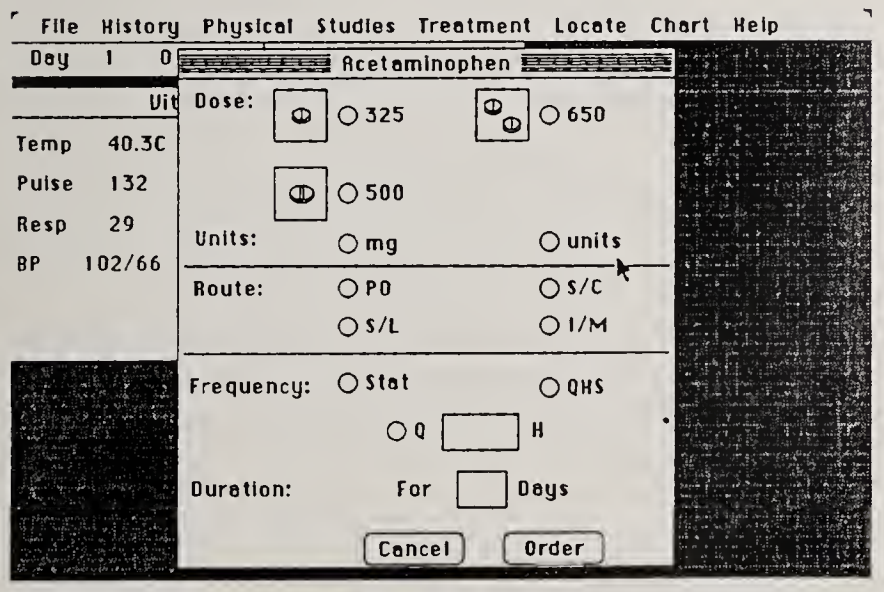

Figure 3: Drug prescription selected for tylenol - recognizes tylenol as being acetaminophen.

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Intracavernous Papaverine Injections Effective Treatment for Impotence

Zeke Milkovic, M.Sc., 9T0

The management of impotence with intracavernous injections of vasoactive drugs is a new and exciting development in urologic practice. This method has been used to treat men with neurogenic and vasculogenic impotence, and for the differential diagnosis of erectile dysfunction. The muscle relaxant papaverine, used alone or in combination with the alpha-receptor antagonist phentolamine, produces a functionál erection by increasing arterial blood inflow and by decreasing venous drainage from the penis. Three phases are involved in treatment. The dosage determining phase, the training phase in which the patient is taught how to inject himself, and the home injection and follow-up phase. An erection takes 10-30 minutes to develop and will last between 1-2 hours. Patients are instructed to go to the hospital emergency room in the event of prolonged erection (priapism) lasting greater than 4 hours. Detumescence is induced by epinephrine irrigation or by needle aspiration of the corpora cavernosa. A recent report by Sidi et al on patient satisfaction indicated that nearly 80% of the patients were satisfied with the penile rigidity and duration of erection obtained. Patients dissatisfied with the treatment cited the development of tolerance to the medication, lack of sexual spontaneity, inconvenience, side-effects and concerns of the unknown longterm adverse effects as reasons (J. Urol. 140:293-4, Aug 1988). Intracavernous pharmacotherapy is becoming an accepted treatment for impotence. However, longterm adverse effects and their incidence need to be determined. As well, patients need to be made aware of the possible risks of prolonged erection and intrapenile scarring, and the need for frequent follow-up examinations.

Total Parenteral Nutrition in the Surgical Newborn

M.J. Weinberg, M.Sc., 9T0, A. Pierro, M.D.

Total parenteral nutrition (TPN) represents a major advance in the treatment of seriously ill or undernourished surgical newborn. The major goals are to provide adequate nutrition both quantitatively and qualitatively and to maintain body composition similar to that of orally alimented infants. Total parenteral nutrition is indicated whenever the gastrointestinal tract is unavailable for use, or would provide inadequate nutritional intake. For example newborns with major anomalies of the gastrointestinal tract who have been treated surgically. Most cases can be managed on standard intravenous solutions, with each patient receiving 2 types of infusates, an amino acid/glucose/mineral solution and an intravenous fat emulsion. A complex mixture of vitamins is added once a day to the amino acid bag. Researchers in the Department of Surgery at the Hospital for Sick Children are trying to find answers to the many questions which still remain regarding the roles and importance of the various solutions and nutrients.

In one study of 28 surgical newborns, the protein sparing effect of TPN was investigated. It was found that a positive nitrogen balance with simultaneous oxidation of the endogenous fat can be obtained with glucose and amino acids. It was also found that intralipid supplementation provided not only more energy and essential fatty acids, but also significantly reduced protein oxidation, enhancing protein sparing and preserving lean body mass. This was observed even after major abdominal surgery when intravenous alimentation had to be maintained for long periods of time.

In another study the metabolism of intravenous fat emulsion in the surgical newborn was investigated. It was found that surgical neonates showed rapid metabolic adoption to intralipid infusion. At a lipid infusion rate corresponding to a daily intake of 4g/kg, greater than 80% of the exogenous fat was oxidized. At greater fat intakes, fat deposition but not fat oxidation was enhanced. The administration of intralipid lowers the CO_2 production, as a consequence of the cessation of carbohydrate conversion to fat. This could be useful in the clinical management of newborns with respiratory problems because less CO_2 is produced to be eliminated. These and other studies, have helped to clarify some of the important relationships of the nutrients in TPN and have increased the understanding of this valuable management technique.

Non-surgical Alternatives in Gallstone Therapy

Zeke Milkovic, M.Sc., 9T0

Recent advances in treating gallbladder stones have provided patients with alternatives to surgery. Patients to benefit are those who are poor surgical risks, or in whom endoscopy and previous surgery has failed, and those who in principle oppose surgical treatment.

A new orally administered litholytic agent (not yet available in Canada), ursodeoxycholic acid (UDCA) is a chemically modified version of naturally occurring bile acid. Depending on the size and number of gallstones, patients have achieved relief from biliary distress in 4-6 weeks, though treatments usually last one year. Studies have shown that UDCA acts by reducing cholesterol gallstones to a liquid crystalline form that is easily passed through the biliary ducts. As well, it reduces the amount of cholesterol available to form new stones by inhibiting absorption of dietary cholesterol and by suppressing cholesterol synthesis. Ursodeoxycholic acid produces virtually no measurable side-effects during the course of treatment. Its predecessor, chenodeoxycholic acid has fallen into disfavour because of the high incidence of diarrhea and liver damage it produces.

Extracorporeal shock-wave lithotripsy (ESWL) of gallbladder stones is another recent non-surgical approach to therapy. Sackmann et al have reported that in all but one of the 175 patients in their study had gallstones disintegrated by ESWL (N Engl J Med 318(7): 393-97 Feb 1988). The researchers also found that best results were obtained if ESWL was combined with litholytic therapy. The patients in this study required pain management through anesthesia or analgesic medication. However, treatments with a new type of piezoelectric lithotripter require no pain management. (Ell et al, Lancet 2:1149-50 1987). Thus, the nonstressful, painless treatment of gallstones on an outpatient basis has a promising future.

Tracheomalacia

E. Brown, M. Weinberg 9T0, Dr. R. M. Filler†*

Tracheomalacia is a congenital abnormality of the membranous trachea which leads to collapse and obstruction of the airway with inspiration. The child with tracheomalacia typically suffers "dying spells," a sequence of apnea progressing to cyanosis and bradycardia usually during or just after feeding. Recurrent pneumonia is also a problem in these patients, because of ineffective cough. The weakened trachea may be compressed with food bolus or increased intrathoracic pressure which accompanies coughing, thus their ability to clear secretions in diminished. What follows is a short review of three breakthrough studies on the successful treatment of tracheomalacia.

In their 1986 study, Blair, Cohen, and Filler reviewed 21 patients with tracheomalacia who were treated with aortopexy, which is the attaching of the ascending aorta and innominate arteries to the sternum, thereby pulling the anterior wall of the trachea forward and preventing collapse. Three also required external airway splinting of rigid Marlex sutured to the membranous trachea or wrapped around three quarters of the tracheal circumference. The need for external splinting was determined by involvement of the entire intrathoracic trachea at initial bronchoscopy. Airway obstruction was relieved in all. Aortopexy has proven to be a safe way to relieve the problem of tracheomalacia in most patients. A patent lumen is maintained despite continuing compressive forces of expiration and deglutition.

In 1987 Vinograd, Filler, and Bahoric studied the long term functional results of splinting a collapsing major airway with a silastic Marlex mesh prosthesis. Six children in whom follow-up had been longer than four years were all leading normal active lives. The only long-term complication was a serous effusion that developed around the splint and compressed the trachea in one child 2 years post-operatively. The splint was removed to relieve the airway obstruction, and tracheomalacia did not recur. These results demonstrate that the application of synthetic graft to a segment of a malacic airway in young patients can provide long-term relief from airway collapse without compromising airway growth.

The treatment of tracheomalacia with aortopexy has proven successful, however, bronchomalacia presents major difficulties in treatment. In 1987 Vinograd and Filler et al created tracheomalacia by removing the posterior 50% of the circumference of cartilage rings from intrathoracic trachea in 12 piglets. In 6 animals free tibial periosteal grafts were applied over the malacic area. The other 6 piglets acted as controls. These animals were assessed 6-8 weeks after surgery. At bronchoscopy, it was found that total tracheal collapse during coughing occurred only in the controls. All periosteal free grafts produced osseous tissue and became incorporated into the weakened tracheal wall and prevented collapse.

The treatment of tracheomalacia has seen much progress recently. Aortopexy and Marlex splinting have both shown promise when the trachea is involved, and periosteal grafts may be of benefit when bronchi are involved.

** The Chicago Medical School; † Surgeon-in-Chief, The Hospital for Sick Children.*

BOOK REVIEWS

The Hunger Machine

by Jon Bennett
CBC Enterprises, Toronto, 1987. 222 pages. $14.95

> "It's been called the invisible killer, the silent emergency.... It is the grinding poverty which, day in day out, deprives millions of people across the globe of the essentials of a decent life."

So begins the preface to "The Hunger Machine". Based on the CBC Television series, "The Politics of Food", this book explores the root causes of hunger in the world. The introduction notes that the book is primarily about inequalities. Specifically, it is the inequality of poverty that is elaborated on throughout the text.

The author, Jon Bennett, systematically attempts to debunk the myths that are maintained about the primary causes of hunger in the world: shortage of food, overpopulation, and bad weather. First, he argues that the problem is one of access to food, not shortage:

> "The 12-nation EEC spends US$63,000 an hour to store 1.4 million tons of unsold butter in refrigerated warehouses. Its mountain of skimmed milk weighs almost 1 million tons." (p. 169)

With respect to overpopulation, the author defends his contention that it is not the major cause of world hunger, while admitting uncontrolled population can aggravate the problem. In fact, it is argued that poverty causes overpopulation not vice versa. Fertility is high as a safeguard against infant mortality by uneducated people, the majority women, who view children as workers to insure the survival of the family.

Thirdly, bad weather is not promoted as a cause, only a precipitating factor – one that pushed Ethiopian refugees into Sudanese feeding centres. And finally, Jon Bennett gives a mixed review to a fourth myth, the Green Revolution; it is the 'Miracle of Science' that increased productivity at the expense of widening the gap between large landholders and landless peasants.

The development of current causes of hunger proceeds with case studies of several developing countries, such as Sudan, Bangladesh, and Brazil. The analysis of Sudan vividly portrays the world's economic injustice: Large farms produce cash crops for the world market. When a surplus exists, the price falls, and it is the worker who suffers most. His traditional subsistence farming was replaced when his land was sold to create the large farm. Low income forces peasants to flee to urban ghettos seeking employment. They cannot eat cotton. As for Brazil,

> "In Rio de Janeiro, the city of the glamorous Copacabana beach and casinos, 1 million children survive by begging, stealing and child prostitution." (p. 158)

This study of inequality is not limited to the Third World. The loss of the family farm in rural United States is examined. But, the author chooses to focus on inequality where it is mosty severely felt — the developing world. The political and economic structures at the root of the global disparity are unearthed: the protectionist price subsidies; the economic austerity packages of the International Monetary Fund imposed on debt-ridden countries; and the large scale cash cropping that creates nations totally dependent on the export of one or two commodities.

I was unprepared for such an assault on my preconceived ideas about world hunger. I had thought hunger equaled famine, powdered milk, and Band Aid concerts. As the author explains, famine has been a newsworthy event recently. After watching TV, we are shocked, then desensitized to the plight of the hungry. As the famine headlines diminish, the charitable donations are not sustained. However, this book focuses on the enduring aspects of poverty and its underlying causes.

This thorough examination of the global disparity creates pessimism for the prospects of change in our generation. But fortunately, the book concludes with helpful suggestions to correct the chronic inequalities. The strongest argument is made for people to people contacts through Non-Government Organizations (NGOs). These agencies can bypass the elite of Western and developing countries, and focus on the problems at the rural level. We can support the community projects, such as the construction of wells and dispensaries, that wil sustain local development. But, there is also a call to political action. The author contends that we have a moral obligation to the hungry, and a debt to those who came before us and fought for justice in our own country. There is an entreaty to reject both the economies of the socialist countries, where hunger has been reduced at the price of loss of freedom, and the freedom to starve of the unfettered capitalist markets.

The major criticism of this book is more a flaw inherent in the subject material itself. Is there sufficient proof for the author's contentions? The analysis occurs in the open system of the world's economy. Bennett does furnish facts and figures to support his arguments, but much of the data is based on estimates – subject to the interpretation of the analyst. The text is sprinkled with charts, photographs, and personal anecdotes of peasants in their plight. I could not help but imagine that somewhere there is a rebuttal being written to the contentions of this book, complete with its

own favourable statistics, and photographs of smiling faces in Third World villages. This rebuttal may not be so accurate, but it would serve as mental ammunition for those, who are at heart, disinterested in the problems of hunger in the world.

What is the relationship between hunger and medicine as communicated through this book? First, economic progress will determine the quality of health care in a nation. Sudan is used as an illustration of one of the countries where preventative care in rural areas is hampered by lack of fuel or vehicles, basic medicines or skilled personnel. The result is an increased curative medicine demand, dependent on the resources of the Ministry of Health. Underpaid physicians are leaving the country to work abroad. The private clinics exist for those who can afford to pay.

Hunger and medicine are fundamentally inseparable. Any book that examines the causes of poverty and promotes solutions, has a significant part in the campaign against disease in the world. Subsequently, I would consider it to be a recommended reading for all health professionals. For those who believe that health and access to health care are universal rights, a reading of this book would be especially rewarding. And it is hoped that we will do more than just read – we will act on it.

Paul Thistle, 8T9

Sympathy and Science

By Regina Markell Morantz-Sanchez
Oxford University Press, New York, 1985. 464 pages.

Regina Markell Morantz-Sanchez is a name unlikely to become a household one amongst doctors or medical students. However, since her scholarly and well-presented work should be recommended reading for those of us ignorant of her subject. Morantz-Sanchez is a historian specializing in the history of women in medicine. She has written a previous book presenting oral histories of women physicians, also a thoroughly readable book. It is highly commendable, then, that she has produced a book that is accessible to the interested layman, the physician, as well as the professional historian.

The fascination of the book lies in its deft and convincing narrative. Grounded in a thorough knowledge of social history, medical history and women's studies, Morantz-Sanchez throws light on the intersection of these areas for the benefit of the curious. Although it is clearly a valuable contribution to research in the field, my personal reading was one of discovery. All of us in medicine today have consciously or unconsciously been influenced by past attitudes towards the profession and its practise. The struggle of women to be accepted in the mainstream of professional medicine is not historical fact – the issues are relevant today.

Importantly, Morantz-Sanchez presents the thesis that "women in medicine have never been united in their perspectives, and most have used varied approaches to healing." She covers within a broad chronological framework – women in American medicine from the colonial period to the early decades of the Twentieth Century, with major focus on the Nineteenth.

Highlights include tactical opposition by male physicians, who changed their basis for argument with each passing wind. "Higher education for women produces monstrous brains and puny bodies; abnormally active cerebration and abnormally weak digestion; flowing thought and constipated bowels", said Dr. E.H. Clarke, a Harvard professor who published a famed book on the subject. "Menstruation was depicted as mysteriously debilitating and higher education in any subject as sapping the energy needed for normal development of the reproductive organs."

In addition, there were those physicians who chose to try public humiliation of their female students. Dr. Dorothy Reid Mendenhall recalls of Baltimore in 1900: "The speaker talked on some disease of the nose. But from the start he dragged in the dirtiest stories I have ever heard... and when he couldn't say it in English he quoted Latin from sources not usually open to the public... comparing the cavernous tissues in the nasal passages to the corpus spongiosa of the penis."

Morantz-Sanchez effectively contrasts the elements of 'sympathy' and 'science' in the careers of two women physicians, the holistic healer Elizabeth Blackwell who held the Victorian belief of women as morally superior, and Mary Putnam Jacobi, who studied in Paris and insisted that women could participate alongside their male counterparts, without a special 'female' or nurturing role.

An aspect of the work that particularly struck me (although I suspect that each individual would find a topic of specific appeal), was the role of women in public health. This was one major contribution of a specific female vision of medicine. Women were substantial contributors to early American public health development, founding the Public Health Education Committee of the AMA. The Children's Bureau of the Department of Labour was largely administered by women at the time of the pioneering Sheppard-Towner Act of 1921, which provided for a federal committment to maternal and infant health care. Due to pressure from the AMA, Congress declined to renew the act in 1929. Its demise marked America's turn away from a permanent governmental responsibility for the health and welfare of its citizens. It also confirmed the high-tech direction of American medicine which makes the U.S. a leader in both CAT scans and infant mortality rates. "Women worked in public health both by choice and because they were forced into a backwater after being excluded from elite mainstream medicine."

Sympathy and Science suggests that the search for a better balance in medical visions and the move towards equality may continue to benefit each other.

Sumana Reddy, 8T9

I Don't Know What to Say:
How to help and support someone who is dying

by Dr. Robert Buckman
Key Porter Books, $19.95, 195pp.

"I don't know what to say" is a comment frequently spoken to staff by visitors to patients who are dying. Medical students and staff, too, may find it difficult to know how to approach a patient with a terminal illness. Dr. Buckman's excellent book is primarily aimed at non-health care workers, those who have a family member or friend who is dying, but students will also find much to think about from reading this book.

Those who have gone through the Year II and III Clinical Methods course wil recognize some of the content of Part One "Talking and Listening" from the videotape, also made by Dr. Buckman, on empathetic listening. The second section "The Transition" is the largest, discussing the patient's reaction to various stages of a terminal illness, from "facing the threat" to "saying goodbye". Of equal importance, however, is the discussion in each chapter about how the friend or family member might feel about and react to the patient's illness and emotions. The final section "Practicalities" contains one chapter devoted to suggestions for things that someone who wants to help can do, from hospital visits to babysitting to helping with the housework. This section also discusses the loss of specific people in one's life, and the differences between losing a parent and losing a child, for example. He also discusses the special difficulties of supporting someone with AIDS or a dementing illness. In the final chapter, Buckman offers suggestions for improving communication between the family and health care professionals.

The book is well written, in the first person, almost as a discussion between Dr. Buckman and the reader, for example "You may also feel that ...". It is easy to read and non-technical, without seeming to be condescending, and contains a large number of anecdotes which illustrate the points that he makes.

I highly recommend this book to medical students for their own interest, and to anyone with an interest in terminal care or cancer therapy, so that they can be aware of what book to recommend to patients, family and friends.

Catherine Birt, 8T9

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